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Lessons in Bioecological Research Design from Flint, MI: Get to know the participants!

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LESSONS IN BIOECOLOGICAL RESEARCH DESIGN FROM FLINT, MI:
Get to know the participants!

by

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ABSTRACT

The historic events of the Flint Water Crisis (FWC) have led to a variety of intertwined mental and physical health, developmental and sociological outcomes in Flint, MI. Urie Bronfenbrenner's Bioecological Model of Human Development provides a suitable model for considering the full complexity of these factors. This model allows researchers to conceptualize within complex systems the nuanced sites and relationships in which development occurs. However, designing research based on this model is widely considered to be excessively challenging. This thesis outlines the process of designing Bioecological research in Flint, MI and presents examples from a pilot study which suggest that a process of 'getting to know' participants may be key in overcoming some of the challenges of bioecological research design.

Keywords: Research Design, Flint Water Crisis, Bioecological Model

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INTRODUCTION AND BACKGROUND

1.1 A personal note and some acknowledgements

Early last year, I was provided an opportunity to work at a law firm representing children affected by the Flint Water Crisis, and they graciously allowed me to pursue my education in psychology alongside the job. It was a unique opportunity to do everything I had started to see as important to me during my college career—child development, public health, advocacy and community based work —all at once, addressing an urgent social-justice issue. I am very grateful to the deeply humanitarian team at work that supported my endeavors in this regard, and for my family, friends, teachers and college administrators, who have inspired, encouraged and supported me throughout this journey.

1.2 A Water Crisis in Flint, MI

I.

In the early 20th Century, after William Durant headquartered General Motors ("GM") in Flint, MI, already home to major Chevrolet and Buick operations, it became America's "Vehicle City" (McClelland, 2013, p.3), a prosperous and politically significant metropolis. GM had built one of America's greatest cities. Within four decades, the city's people had catapulted the vehicle-maker to a whopping 54% control of the American auto industry. 20-odd years later, GM thanked them by beginning to move tens of thousands of jobs away from Flint to cheaper places, in the middle of some of its biggest profit years. (See CNBC, 2010; Dillon, 1998; McClelland, 2013; Pulido, 2016 and Rosner, 2016 for more information on the history of GM in Flint.)

Ever since, between recessions and increasing competition in the worldwide auto-industry, GM has steadily declined, but never quite hit rock-bottom. The City of Flint, on the other hand, has rapidly plummeted into significant disrepair. De-industrialized, Flint's population decreased steadily from 196,940 at its peak in the 1960s to just a little over 98,310 in 2015, with a substantial chunk of the depopulation occurring in a sharp drop of 17.4% between 1970 and 1980— the

same decade during which GM had begun to move jobs away from Flint. Notably, 'White-Flight' had caused a disproportionate increase within the Black population in Flint during the same period of general depopulation. But even as the wealthy (and often white) tax-payers of the city boarded up their houses and packed their bags, a sprawling, expensive "corporate landscape" (Moyo, 2017, p.244) of leisure and consumerism was left behind for the least mobile of Flints citizens to maintain. (See CNBC, 2010; Darden et al., 1998; Moyo, 2017 and Pulido, 2016 for more information regarding racial stratification and depopulation of Flint, and Edsforth, 1987 for more information regarding the corporate creation of a consumerist culture in Flint.)

No one could have imagined that the city, built carefully over a century, would be broken so swiftly and completely. After all, Flint was made to believe that it was America's city, and not GM's.

II.

Today, walking through downtown Flint, you are likely to be gripped by two senses: one of vigilance, and one of mournful awe. The storied past of the factory town is loudly evident in the grandiosity of the exterior of the old Northbank building; but you cannot miss Flint's reputation as one of America's most dangerous cities as you watch a woman lock her colleague inside their downtown office as she leaves it to show you around the disquietingly empty historic building that it is nested within. (See Engel, 2016 for more information regarding violent crime and danger in Flint.)

Venture away from downtown, towards the riverbed, and along your cautious walk you'll agree with Edward McCelland's (2013) observation that Flint, "in mid-summer is one of the lushest cities in America… oaks and elms in the sky, yarrow, chicory and goldenrod on the ground… Grass grows along lightning patterns in cracked sidewalks… Weeds rise to full tide in empty lots" (p.1).

Yes, Flint is a mixture of verdure, nostalgia and desolation. Your thoughts easily wander to poetry that mirrors this landscape:

> shuffle
> Down the weed-split sidewalks
> Past the boarded-up display windows
> Of The Fair, United Shirt, Nobil Shoes,
> While at the curb monstrous green Buicks
> Idle and rust. The day is overcast,
> Threatening drizzle, feinting autumn,
> And further calamity. (Rendleman, 1995, p.225)

Even as this foreshadowing verse from Danny Rendleman's (1995) poem, *Cheese Lines, Flint, Michigan,* echoes deep in your wandering thoughts, you notice that the stench of the river has gracefully ridden a zephyr to hit you straight in your face. The rumination is short-lived. Flint has woken you up.

You reluctantly realize that residents of Flint have been *drinking* the water you cannot even stand to smell since 2014, after a state-appointed emergency manager, Ed Kurtz, approved the city's water supply to be switched from Lake Huron to Flint River in 2013 as a potentially cost-saving, but ultimately disastrous, austerity measure (see El-Sayed, 2016; Finnegan, 2016; Giroux, 2016; Hammer, 2016; Mann, 2016; Ranganathan, 2016; Pulido, 2016; and Salinsky, 2016 for more information regarding the role of Kurtz, financial austerity and other economic factors leading up to the switch between water sources).

Months after this switch, amidst vocal complaints from community members regarding the appearance, odor and taste of the water (see Bosman, Davey & Smith 2016 and Davidson, 2016 for more information regarding citizens' complaints and the official responses to them), the city negligently issued boil warnings misleading citizens by stating that E-coli was the worst they had to fear (see Atkinson, 2016 and Hammer, 2016 for more information regarding the various announcements made regarding Flint water). Boiling the water actually ended up increasing the concentration of lead in residents' water (see Atkinson, 2016; Abernathy et al., 2016; Davidson, 2016; Hammer, 2016; Katner et al., 2016; Lieberman, 2016; Masten et al., 2016; Moyo, 2017;

Pieper, Tang & Edwards, 2016; Stillman, 2017 and Yang, 2016 for more information regarding Flint water infrastructure and regulations as well as the discovery of lead in the water). Simultaneously, the city allowed one of the few remaining GM plants in the area to switch to clean Flint Township water because the Flint river water (still being supplied to millions of homes in Flint) had proven too corrosive for the truck parts being manufactured there (see Giroux, 2016 and Robeznieks, 2015 for information regarding the GM plant's switch to clean water before the rest of the city).

Half a year later, the city admitted that the water-levels of trihalomethane, a chlorine disinfectant byproduct which can cause liver and kidney problems with long term exposure, have exceeded federal limits (see Bellinger, 2016; Goovaerts, 2016; Hammer, 2016; Hanna-Attisha et al., 2016; Hohn, 2016; Kennedy et al., 2016; Laubach, 2016; Markel, 2016; Masten et al., 2016; Miller & Wesley, 2016; Pieper, Tang & Edwards, 2016 and Salinsky, 2016 for more information regarding trihalomethane in Flint water). Workers were seen moving coolers of clean water into state buildings within days of this warning (see Giroux, 2016 and Markowitz & Rosner, 2016 for more information regarding this sighting), but it was nearly a year later that the administration finally dispatched an official warning to residents instructing them not to drink the water without using approved filters (see Goovaerts, 2016; Kennedy et al., 2016; Nelson, 2016; and Salinsky, 2016 for more information regarding the announcement and filters).

Residents like LeeAnne Walters (see Lurie, 2016 for more information regarding LeeAnne Walters) and Jan Burgess (see Chambers, 2016 for more information regarding Jan Burgess) who had been paying water bills rivaling their rent costs for visibly dirty water that was making their families sick despite living next to Earth's largest fresh water supply (see Semuels, 2016 for more information regarding the irony of Flint's proximity to the Great Lakes), left with no other choice, had started to take matters into their own hands, contacting scientists independently to have their water tested and creating something of a revolution along the way by mobilizing hundreds of

neighbors to join in their citizen science effort (see Markowitz and Rosner, 2016; Pieper, Tang & Edwards, 2016 and Soleri et al. 2016 for more information regarding citizen science and the mobilization of Flint's community). In LeeAnne Walter's home alone, they found that "all water samples contained lead above 15 µg/L and several exceeded hazardous waste levels (>5000 µg/L) parts per billion of lead" (Pieper, Tang & Edwards, 2016, p.2007), while government hired agencies had been reporting far different numbers and claiming, via a longstanding tradition of deceptive sampling methods, that Flint's water was in fact in compliance with federal regulations (see Burke, 2016; Davis, 2016; Edwards, 2016; Hohn, 2016 and Masten et al., 2016 for an overview of the long history of deceptive water sampling in the U.S.A. that also affected Flint, MI).

As you grapple with this evidence that Flint's corrosion control measures had been terrible for decades, and that the city's pipes were in the worst possible condition to tolerate a switch to the Flint river water (see Davis, 2016 and Edwards, 2016 for more information regarding the impact of the age and disrepair of the water pipes on the water crisis), you also remember that EPA emails containing statements like "I am not sure Flint is the community we want to go out on a limb for" (Katner et al., 2016, p.9) have been released, and start to piece together where the tangible distrust you feel as you walk through the city is coming from (see Cuthbertson et al., 2016; Edwards, 2016; Hohn, 2016; Lieberman, 2016; Mann, 2016; Miller and Wesley, 2016; Moyo, 2017; Roy, 2017 and Stillman, 2017 for more information regarding mistrust and misinformation in Flint).

Indeed, governmental actions appear to have been at the root of this issue starting a very, very long time ago— people have noted "the loss of revenue sharing from state to local authorities as the major contributor to the decimation of Flint City's revenue and consequently, problems with infrastructure maintenance, including provision of healthy water" (Moyo, 2017, p.238); with Flint losing nearly 55 million dollars of revenue sharing from Michigan state over the last decade.

The declaration of Flint as needing emergency, undemocratic management— which ultimately led to the disastrous switch —began with the "state…trumpeting its sound fiscal management and admonishing local governments for not being as efficient… [while failing] to mention… that it balanced its own budget on the backs of local communities" (Moyo, 2017, p.239-240).

Immersed in these thoughts, you can almost see the green of dollar-bill-ink in the river as you stand at its edge; but you quickly remind yourself that the color of the water is more likely a result of the 26-and-a-half-million gallons of industrial waste that Craven and Tynes (2016) report GM had been dumping into the river daily for at least the entire year of 1965. In fact, Michigander Howard Markel reports that in his youth "people used to laughingly refer to the Flint River as "GM's sewer" (Markel, 2016, p.231). And so, as you stare into the water, it comes alive before you why a Flint resident noted to journalist Sarah Stillman (2016) that even as a young eight-year-old, he already knew that it was not safe to ingest anything from the river. You are left asking yourself: could there really be a reality in which no-one involved in deciding on the switch had worried about the basic potability of the water?

At this point, it is clear to you that an entire city has been systematically poisoned for the last two years by lead, a dangerous neurotoxin that causes permanent developmental aberrations in the brain, causing significant cognitive and behavioral problems in children under ten, along with a variety of other issues, including immunotoxicity, hearing loss, dental problems, digestive issues, reproductive organ damage, severe, painful skin rashes, hair loss, and so on (see DeWitt, 2017; Hanna-Attisha et al., 2016; Kaufman et al., 2014; Miracle, 2017 and Warren, 2001 for more information on the effects of lead poisoning). You realize that this is a matter of criminal negligence at best, and perhaps, as Dr. Stoller (2016) has characterized it, a "depopulation experiment" (p. vii) at worst.

Your reluctance is leaving you rapidly as you begin to see the reality of what Michael Moore (2016) describes as "an American political ideology hell-bent on widening the income

inequality gap and conducting various versions of voter and electoral suppression against people of color and the poor" (para. 7). You begin to buckle under the realization that biased sampling and neglecting infrastructural maintenance over military and other spending is not an issue localized to Flint, and neither is that of corporate power over governments. It is occurring to you that this could happen to any one of our 'great' cities (see Baum et al., 2016; Early, 2017; Levin, 2016; Mooney, 2016 and Weesjes, 2016 for a discussion of how the circumstances in Flint that led to the crisis are seen in many cities across America).

And so you find yourself paralyzed at the Flint riverbank, wondering how a city Edsforth (1987) once called "a model of labor-management harmony to the nation… [an] All-American City" (p.218)— a city that is arguably the very birthplace of the American Dream— is today inspiring the hasty exit of the illusion of meritocracy from your psyche. (See Rosner, 2016 for a discussion of the great significance of Flint in the history of labor rights movements in America).

III.

As always, the vacancies of trust and direction left by such travesties as the Flint Water Crisis are quickly and contentiously grabbed by new voices and ideologies. The outcry must be subdued rapidly, and there is always a voice of steely reason in the room waiting for the moment when they can ask "so, what comes next?"

With the stability of the entire nation riding upon the city's unfortunate limelight, the question is begged: should we peddle new hope to Flint? Yes, says FlintFwd, "a movement inspired by the resilience of the people of Flint, MI. People that are passionate about disrupting the current narrative surrounding the city. It's proving that, together, the people of Flint can make it through seemingly insurmountable perils and come out the other side stronger, prouder, better than ever" (Flint Fwd, 2016, para. 6).

Flint's people have indeed been a fighting force, a resilient, vocal and mobilized community — that this issue is one we are familiar with at all is a testament to their extremely hard work,

despite the prejudices they faced. Still, we must not forget that the battle they fight is much larger than the specific events of the crisis. As Stillman (2017) has reported, the director of the Office of Community Scholars and Partnerships at Michigan State University's College of Human Medicine, a man named Kent Key, has clearly identified that while there is an extant narrative about Flint's community being a small, impoverished and unassertive African-American community without a voice which needs assistance, it is on the contrary a community of people who had been fighting the water switch for a long time, even before it was approved by Kurtz. Key considered Flint's locals as having done everything correctly in terms of expected procedure to stop such a travesty, but explained that their efforts were ignored anyway because, in his opinion, there is a greater issue stemming from the history of the racist, systemic discounting of communities comprised of people of color (Stillman, 2017).

Concomitantly, there is a great precedent for strapping communities of color with environmental hazards, and these racist roots of the Flint Water Crisis are not unnoticed by politicians, residents, or other experts (for instance, see Hammer, 2016; Krieger, 2016; Mooney, 2016; Novick, 2016; Parker, 1999; Pulido, 2016; Ranganathan, 2016; Ryder, 2016; Sadler & Highsmith, 2016). Craven and Tynes, (2016) reported that a congressman named Dan Kildee has admitted he does not truly believe that the state of Michigan would have let the issue go as far as it did in Flint if it had taken place in a richer community composed of fewer minorities; and Dr. Bullard, a pioneer in environmental justice, has affirmed that "Environmental racism is real...so real that even having the facts, having the documentation and having the information has never been enough to provide equal protection for people of color and poor people… It takes longer for the response and it takes longer for the recovery in communities of color and low-income communities…. regional EPA officials and state officials in Michigan responded first with a cover-up, 'and then defensively—either trying to avoid responsibility or minimizing the extent of the damage,' as contrasted with handling of other environmental problems in predominantly white

communities" (Campbell et al., 2016, p.951). Perhaps Flint's future might not be so hopeful after all.

But still, with GM scheduled in 2017 to (benevolently) shift some of its truck production from Mexico to Flint in order to appease customers seeking American-made products while also increasing the profitability of its Mexican shipping-port-location by allowing it to expand its export operations (Burden, 2016), one might surmise that perhaps the American Dream has not died yet. In fact, there are even people coming to Flint from halfway around the world in search of it (see Young, 2015 for more information regarding the influx of international students from Asia in Flint, MI). Maybe they can be allies in the community's efforts to remind the state and country that spending on basic infrastructure— sometimes as little as the "$100 per day" (Salinsky, 2016, p 289) it would have cost the city to add corrosion control additives to the water to prevent the water crisis-- saves billions of dollars in remediation costs. (See Early, 2017, for a discussion of how newcomers to communities can contribute to successful grassroots political movements.)

While migrants to Flint may be entering the city mobilized, older residents seem to be stuck in a difficult situation according to Brayman (2016), with relocation proving to be mostly unaffordable for them, and even if it were affordable, there are very few areas in the deteriorating Rust Belt that seem accommodating. Furthermore, Brayman (2016) reports that residents of Flint feel that things might get better because there is a solidarity that perseveres within the community despite everything. Indeed, Moyo (2017) corroborates that there is a sense of community in Flint, especially for residents of color, that encourages people to stay: reporting that having moved from "Eau Claire, Wisconsin a city reported as the safest city in the United States because of its whiteness," she found "[she] had no community in this safe city; now, in troubled Flint,[she does]" (p.233).

But even as one considers the future of Flint assuaged by visions of reinvestment, repopulation and community engagement, Moyo (2017) warns that it is important to remember the dangers of equating citizenship with consumership and couching perspectives regarding human rights in utilitarian economic discussions. To begin with, "the curtailment of investment in black neighborhoods and the government's assistance for companies to move out of predominately black neighborhoods… were created by government through segregation policies in the first place" (Moyo, 2017, p.233), so relying on the same "neoliberal ethics" that "[disregard] justice in favour of cost saving and, as such, [continue] to undercut human needs" (Moyo, 2017, p.244) is unlikely to bring true improvement to the lives of Flint's residents. Additionally, such a perspective encourages a "paternalistic…silencing" role for the state, and a "politics of selective intervention" that engenders "question[s] of reach" regarding those excluded in the process of selection, resulting in a situation where "the city as a whole is claimed by a few" on the basis of economic capacities rather than a recognition of every citizen of a democracy's basic human right to participate in their own government (Moyo, 2017, p.244-p.245).

Indeed, prejudices against the poor create toxic contexts of contempt and mistrust. Despite "several meetings where residents would talk with city officials about the water issue… city officials would assure the public that the water was safe and/or dismiss the residents' experiences" (Moyo, 2017, p.237). Even after the people of Flint became citizen scientists and helped in conducting the independent investigations that exposed the high concentration of lead in their drinking water, as Mantha (2016) has reported, they still faced an uphill battle for months getting the government to admit the full extent of the issue. Davidson (2016) has hypothesized that a sense of contempt for the citizens of Flint may be at the core of the tragic Flint Water Crisis. She explains, based on her investigations into the crisis for the New Yorker, that it appeared that officials considered the water to be perfectly alright, feeling instead that the residents'

opposition to drinking the Flint river water was shallow and a relic of what they perceived to be the culture of poverty, rather than emerging from justified, informed fear (Davidson, 2016).

This prejudiced mistreatment "led to further distrust of city and state government" (Moyo, 2017, p.237), and ultimately, "the decline in public trust was palpable" (Roy, 2017, p.25) in Flint. Indeed, the citizens of Flint retained the right to such mistrust, having been plagued by a deadly, but completely preventable crisis due to contemptuous negligence. As Dr. Bellinger (2016) has explained, preventing and solving the water crisis is not an issue of the lack of awareness or tools, but rather of a lack of determination: "we have the knowledge required to redress this social crime. We know where the lead is, how people are exposed, and how it damages health. What we lack is the political will to do what should be done" (p.1103).

Yet, regardless of whether mistrust is justified or not, re-establishing trust is arguably a significant issue for any community, especially one in the process of rebuilding itself: while such mistrust had limited positive effects, such as propelling Flint's residents into coalitions with non-Governmental scientists; as Roy (2016) has pointed out "trust voids are often a perfect breeding ground… to capitalize on rampant fears" (p.23). Additionally, Miller and Wesley (2016) have asserted that mistrust in communities engenders negative attitudes and compounds the negative effects of crises like the one in Flint.

And so, some, like the Flint River Watershed Coalition, are indeed setting out to remind the community of trust— in its natural resources. They urge us not to forget that the crisis is hardly the river's fault: reminding us that correctly treating the water, hand-in-hand with a concerted river revitalization program including pollution-control and sustainable development planning would have seen Snyder's switch re-situate the river basin within its role as an essential part of Flint's cultural history and as a valuable asset to the city. The coalition is soldiering on, hopeful that even the current bad publicity can be leveraged into constructive action towards their agenda

of reviving the river, by getting people to at least pay attention to it. (See Atkinson, 2016, for more information on the coalition and its focus on rehabilitating the Flint River).

But how do you reconcile such hope with the reassignment of Darnell Early (the emergency manager who brokered the switch to Flint river water) to emergency management of nearby Detroit's defunct public schools (see Kennedy, 2016, for information regarding this), and the sad truth of the irreversibility of the damage caused by lead exposure? Can the community move forward without establishing accountability for the events of the crisis? Have the various problems that occurred simultaneously to lead to a tragedy of this magnitude been explored effectively enough reassure Flint that it can move forward from a place of having absorbed the lessons that this situation offered for learning?

IV.

In a 2016 speech, President Obama urged the residents of Flint to remember that humans are resilient, that we survive: "I did fine with a single mom, and a lot of you did fine growing up in a tough neighborhood. [The children will] make it as long as we're there for them and looking after them, and doing the right thing for them and giving them the resources that they need. (Applause.) Don't lose hope" (para. 69).

But, he also pointed out to them that "there is a larger issue that we have to acknowledge, because I do think that part of what contributed to this crisis was a broader mindset, a bigger attitude, a corrosive attitude that exists in our politics and exists in too many levels of our government…it's a mindset that believes that less government is the highest good no matter what… an ideology that undervalues the common good, says we're all on our own and what's in it for me, and how do I do well, but I'm not going to invest in what we need as a community" (Obama, 2016, para. 26). He went on to explain the consequences of this attitude, highlighting the dire need he sees to fix it:

> You end up seeing an underinvestment in the things that we all share that make us safe, that make us whole, that give us the ability to pursue our own individual dreams. So we underinvest in pipes underground. We underinvest in bridges that we drive on, and the roads that connect us, and the schools that move us forward… it's not enough just to fix the water. We've got to fix (this) culture of neglect, the mindset… that has degraded too many schools and too many roads and hurt too many futures. We've got to fix the mindset that only leaves people cynical about our government. Our government is us — of us, by us, for us — the people. (Obama, 2016, paras 26-28)

President Obama's speech was as full of truth and wisdom as ever, but he may not have known as he spoke that he was speaking to a town whose people had seen occasion to blandly note "we're like disposable people here. We're not even human here, I guess" (Leary, 2016, para. 29).

V.

Hopefully, to most of us left reeling and confused by the events in Flint, there is no doubt that the people of Flint are human; and that no one is disposable. With any luck, in our sudden proximity to this story, most of us will also feel the gnawing reality we have been grappling with for some time now— that our world is set up to value some human lives more than others, and this ultimately to the benefit of absolutely no-one — finally clench down and sink its teeth into us.

As President Obama said, it really isn't enough to fix the water or change the pipes in Flint: most American infrastructure is now hundreds of years old, and as discussed previously in this paper, many similar towns across the country are on the brink of their own disasters as they shrink from depopulation and the loss of their own corporate lynch pins, losing their democracy to financial emergencies and an unfair stigmatization of the poor. The attitudes that led to this crisis must change. We must take the time to study, understand and ensure— to a standard that each of us, *the people,* is happy with —that every life matters equally. How we reconcile our hopeful visions for a just and democratic future with the obstacles to it currently present within the very structures to which we have entrusted this future cannot be a rhetorical question. It is one that we *must* answer, and we must do it carefully, in detail.

1.3 Rationale and objective

In answering this question we must re-examine the knowledge that brought us here; acknowledge the past lessons we have forgotten to apply— taking a hard look at why we missed them —and we must meaningfully consolidate the new knowledge that we think can reform us. Through both our specific disciplinary perspectives, and with consideration to interdisciplinary knowledge, we must all work together to understand and address the various issues raised here. In this undertaking specifically, the discipline of developmental psychology is considered, putting it in vital conversation with other perspectives as described above, identifying how to sustainably apply the lessons of the field to the situation in Flint so that the crucial "promise for democratizing government, industry, [and] also science" (Lambrinidou, 2016, p.12058) recognized above may be fulfilled.

Developmental psychology is an old and essential branch of psychology. It is typically considered to be a discipline dealing with cumulative progression or advancement *over time*; studying the factors that enable the movement to different forms of experience— emotions or awareness —or from one set of behaviors to another, and identifying impediments and catalysts for this kind of change. Starting from its earliest roots in Jean-Jacques Rousseau's writings, the field has always been concerned with an ideal orientation of being, defining growth by its culmination into some or the other interpretation of mature forms; and has been studying growth from this imaginary end-point— indeed, many contemporaries of the subject have recognized development, for this reason, as a value laden concept (Schecter, 2011). As critical perspectives like these gained prominence over the course of the 20th century, conversations about the importance of observing development unfold naturally, in natural settings, as opposed to the tradition observing experimental manipulations of the process gained momentum. (See Harris & Butterworth, 2012, for information regarding the focus and history of the field of developmental psychology).

Urie Bronfenbrenner (1917-2005) was a psychologist of this new school, and was one of the few amongst his peers who was specifically concerned by the pervasive effects of poverty on development. He is credited with creating the *bioecological systems* theory of development. Bronfenbrenner's theory explains *development*, and not just behavior, as a function of a person's reciprocal interactions with their whole environment. Eventually, under his active advocacy, this theory was used to form the nationwide Head Start program, an early intervention system which attempts to mitigate the developmental setbacks encountered by underprivileged children. (See Ceci et al., 1997, for more information on the Bioecological model, which will also be discussed further in this paper; and Ceci, 2006 and Lang, 2005, for more information on the life and achievements of Urie Bronfenbrenner).

It was in this milieu of change and progress that, many years ago, in 1986, on the 50th Anniversary of the Society for Research in Child Development, Urie Bronfenbrenner and some of his colleagues: Frank Kessel, William Kessen and Sheldon White, reflected together upon the state and future of the field of developmental psychology. They established that "developmental psychology… is a cultural invention" (Bronfenbrenner et al., 1986, p.1222), and each of them, being scientists who had persistently put their work in immense public service, exhorted colleagues to test frequently the socio-political relevancy of their work; rather than relying on industrial norms for guidance, since the latter can be self-serving.

In laying out a framework for reconciling their discipline with their (and arguably the original) vision of it playing an active role in mitigating human issues, as mentioned above, Bronfenbrenner et al. (1986) discussed the roles of "the fragmentation of the field of developmental psychology; and the relations between scientific theory and research and sociopolitical circumstances" (p.1218) in the current shape of the discipline.

On the latter point, they emphasized that the science of developmental psychology is rooted in the movements, histories, governments, and generally in the societies of people:

> [Developmental Psychology] is dependent upon trends in American society, trends in what we generally call American social policy…. [Developmental psychology sings] songs to American society… I've been impressed with the fact that each of the three great periods of growth in developmental psychology— the period of the Child Study Movement at the turn of the century, the period of the Child Development Movement of the 1920s and 1930s, and the period of developmental psychology in the 1960s— is associated with a strong movement in the federal sector, strong growth of new programs, or new developments in public action for growth. (Bronfenbrenner et al., 1986, p.1220-1222)

And on the former point about the fragmentation of the field, Bronfenbrenner emphasized that an interdisciplinary future of developmental psychology is necessary, explaining that while:

> [Developmental psychology] has become more fragmented, the research models we have been using in an effort to understand reality have become increasingly more complex in order to allow for the operation of concomitant interacting forces functioning at various levels of hierarchically organized systems… Once this happened, it became necessary to investigate the relations between modules, and the recognition of higher order systems became inescapable. For example… from a biological point of view, the creature whose development we are studying is now seen as a highly complex system in which biological, cognitive, emotional, and social elements are powerfully intertwined… So I reject the position that we are, and should be, on our way to a more modular science. The modularization of our field, to the extent that it is occurring, is, I submit, a retreat. We are copping out because we do not wish to deal with the complexity of the phenomena we are committed to address. (Bronfenbrenner et al., 1986, p. 1222-1223)

Indeed, decades since this talk in 1986, one of the great achievements Bronfenbrenner is credited with is breaking down the barriers in the social sciences— before him, it is said that "child psychologists studied the child, sociologists examined the family, anthropologists the society, economists the economic framework of the times and political scientists the structure" (Ceci, 2006, p.173). Through his work, we are beginning to see that while each theoretical discipline offers unique and relevant practical avenues of studying human life, behavior, development and learning, the knowledge gained cannot be treated discretely. Furthermore, it is now being increasingly established that our knowledge is incomplete without an understanding of the processes we use to gain it; and just as the feminist theory of intersectionality has found vital the "mutually constitutive relations among social identities" (Shields, 2008, p.301), academics are

finding that many crucial questions can only be answered in the intersections between disciplines; in the practical and theoretical confluences that are created in these spaces. (See Shields, 2008, for more information on the theory of intersectionality.)

Of particular relevance to the field of developmental psychology, following the interdisciplinary trend, it is increasingly evident that the barriers between the social and biological sciences are coming down. With advances in technology and the growing *biomedicalization* of the world, research methodology in the social sciences (including psychology and the study of development which is nestled within it) is becoming increasingly tied up with frameworks of natural sciences, in precisely the way Bronfenbrenner described so long ago. (See Clarke, 2010, for more information on biomedicalization).

A landmark example of this intertwining can be observed in the National Institute of Health's recent investment in the promotion of a 'biopsychosocial model' of brain-and-behavior research that emphasizes studying biomarkers in relation to psychological phenomena (see Suls & Rothman, 2004, for more information); a goal that has never before been more accessible than it is today with advanced brain-imaging techniques so easily available to psychologists. This focus has changed research agendas and design within psychology.

However, the nascent daughter-fields of such meetings between social sciences and recent technological advances (e.g., neuroscience) lack the expansive theoretical structures and principles found in established fields to appropriately guide them into cohesive, progressive and relevant work. The need for theoretical and ideological guidance is one of the reasons that professionals in such fields have been careful to espouse, right from their conception, the interdisciplinary approach that has emerged, as seen above, from the pioneering work of people like Bronfenbrenner; looking to other fields for inspiration and guidance in designing and conducting their research. For example, the work of Shulman et al. (2016) combines theoretical guidance

from behavioral psychology with neuroscience methods such as brain imaging to study risk taking (Munakata et al., 2004).

As such, the modular aspects of disciplinary knowledge remain crucial to the form and function of these interdisciplinary fields, and as they explore interdisciplinary work, academicians involved in such emergent fields have emphasized that the identification of particular avenues of knowledge exchange between disciplines is a crucial consideration for the practical future of various social and natural sciences (Munakata et al., 2004).

It may be that the framework of intersectionality has provided a path to addressing such concerns, which are not dissimilar to the ones regarding fragmentation and cultural relevance discussed in 1986 by Bronfenbrenner and his colleagues: it can be argued that the perspective of intersectionality is revealing that interdisciplinary subjects are important to study both individually and in the areas of intersectional contact between themselves— i.e., there is great significance in studying all three of these related subjects: neurology, neuroscience, psychology together and putting the theoretical and ideological concerns of these fields into conversation early on so that their contributions can be more readily mapped to where they are most needed (Munakata et al., 2004).

These interdisciplinary issues are related to the concerns raised by Bronfenbrenner and his colleagues in 1986 regarding the relationship between science and sociopolitical circumstances. Arguably, although science has visibly been a great actor in guiding policy and culture in recent history, its image as an unbiased arbiter of truth has continued to cloud the reality of scientific (and broader academic) bias towards certain topics, populations and agendas of research: manifested by funding allocations, theoretical gaps and a publishing predisposition towards significant results. Indeed, in the situation of the water crisis it seems that the scientific and academic community were not able to raise alarms, or as Bronfenbrenner et al. (1986) put it, to "sing the songs" (p.1222) about several of Flint's issues— e.g., the developmental consequences of

racial and environmental injustice, of lost socio-economic rights through inequitable impositions of economic austerity, etc. Moreover, it also seems (and perhaps more horrifyingly), that in the example of Flint, the scientific community has in fact subdued social concerns it has addressed in the past, such as Dewey's (1903) lessons on the centrality of democracy to the development of children, and the great movement towards taking cultural orientations in psychology we have seen in revivals of Vygotsky's work. (See Daniels, 2005, for more information on Lev Vygotsky.)

Needless to say, this failure of science is not just a limited social matter affecting certain groups left-out due to biases, but a far-reaching political one that affects the ethos of self-governance in and of itself— by skewing the truth, science is also undermining the truth; the terrifying outcomes of which we find ourselves surrounded by today. Bronfenbrenner and his colleagues (1986) did not warn lightly that continuing to follow a path of social neglect in the interest of "keeping intellectuals employed" (p.1225) was in the best interests of neither the field of developmental psychology, nor humanity. In order to continue to build a wold in which children are able to grow into scientists; a world in which progress is attained by moving forward together instead of by pushing certain people behind; a world in which scientific inquiry is valued — science must add-value and reorient itself with humanistic goals.

Amidst this discussion, it slowly becomes clear why studying Flint, MI is especially relevant in reinvigorating the connections of science with sociopolitical circumstances as Bronfenbrenner and his colleagues have beseeched us to— as we have seen, Flint is a community which has been catapulted into the limelight despite being forgotten, because of rare examples of grassroots community advocacy, citizen science, scientific and academic integrity and whistleblowing, responsible journalism and interdisciplinary collaboration. Of course, there is still much left to do to help the community in the areas that it worked so hard to draw attention to. Studying the unique circumstances of the Flint Water Crisis can both provide a voice and example to the

hundreds of similar communities that are not in the spotlight, while also offering some insight into how Flint can be best supported as they face the consequences of the crisis.

Reciprocally, following the arguments presented above, it is clear that such work will simultaneously benefit science. The circumstances of the water crisis have created an issue that is concurrently (amongst many other things) a neurological, neuroscientific and developmental psychology matter, and the scale at which these issues intersect in the lives of the children in Flint is perhaps unprecedented. Therefore, research in Flint is also important to the growth, contextualization and validation of these respective disciplines. Indeed, throughout the journey of research involved in this thesis, the ceaselessly increasing number of articles available on the topic have demonstrated that there is in fact an influx of researchers interested in conducting research in Flint ever since the water crisis became news.

Having established that Flint provides a salient example for rebuilding a real connection between science and society, the methodological aspects of the issue of scientific bias return to the conversation. As we have seen above, scientific research has so far fallen short of the objective of presenting pressing issues in underrepresented communities in a timely manner. In short order, according to the current discussion, the implication of this is that we must start studying unconventional topics using socially relevant methodologies.

Urie Bronfenbrenner has called upon his students and colleagues to do this repeatedly—and his contributions have been amongst the rare ones which have serviced and remained in service of communities and issues science appears to have forgotten. In fact, several of Flint's children are students of his Headstart program, and their lives, particularly in the current circumstances, provide an extremely vivid realization of the utility of his theories and the salience of his suggestions regarding how child development occurs (and can be impeded) through

reciprocal interactions within an ecology of nested systems which arguably provides "the categories to consider the complexity of an entire community" (Newbrough, 2013, p.141[1]).

However, to remain relevant, such work must be meticulously followed up on and systematically built upon. Otherwise, as Tudge et al. (2009) have posited, the "theories will simply live on until… they fade away as people lose interest… but they will never support the development of our field… in order to retain their scientific value and rigor… theories instead need to serve as the foundation for the explicit, systematic, and deliberate testing of hypotheses. (Tudge et al., 2016, p. 428)

Furthermore, it is arguable that theories must also be conceptualized in an inter-disciplinary way—for example, Bronfenbrenner's bioecological model suggests that the development of Flint's children is shaped equally by their lawyers, doctors, councillors, reporters and businesspeople as it is by their teachers, parents and friends (Ceci, 2006); and so, addressing their developmental challenges requires a collaborative, interdisciplinary approach.

This process of interdisciplinary follow-up has clearly not been conducted as much as needed (neither in Flint nor in the countless similar communities we have still to hear about), and concurrently, quality work based on Bronfenbrenner's theories is also scarce—problems with scientific bias account for this in part, but as research by Tudge et al. (2009, 2016) has revealed, researching human bioecologies effectively and actionably requires deeply considered methodologies which many researchers find challenging to create. Bronfenbrenner has himself noted that creating up-to-date research designs was a challenging priority in his later reflections: "today we are living in a different historical time. As already documented in this article, we are now in a period of growing chaos in the lives not only of families but in all the day-to-day environments of people of all ages. Re-creating social development is the principal challenge

[1] N.b.: here, Newbrough (2013) refers not to the work of Bronfenbrenner, but to the work of Kurt Lewin, a notable social psychologist who influenced Bronfenbrenner tremendously, and will be discussed briefly further on in the paper.

confronting contemporary societies as we enter the 21st century. The necessary theoretical model is now in the making. *The corresponding research designs are our next task.* As for the needed empirical findings, these still lie ahead" (Bronfenbrenner & Evans, 2000, p. 123, emphasis mine).

Adding further to the challenge, as proponents of community-based work have seen, many of the current embodied attitudes towards research of this kind create spaces of miscommunication and inequity between researchers and the communities they are researching, which eventually affects the validity of the data collected. Thus, an important goal of community based work is the realignment of academic attitudes towards the validity and nature of research data emerging from *within* communities. Such work has been argued to be useful in enabling discourse that ties values central to communities together with academic goals and the work of researchers, who are indeed dynamically impacting the communities and phenomena they study in significant ways. (See Hacker, 2013 and Minkler & Wallerstein, 2011for an overview of community based participatory research perspectives).

It is in addressing these methodological dilemmas that this pilot study emerged— within an attempt to 'research the research question,'[2] this study offers dynamic insight into the peculiarities of designing bioecological research within Flint, revealing the larger importance of getting to know one's participants and taking a community-based approach in the work of bioecological research within developmental psychology. By explicating how the socio-cultural conception of development itself is transforming as Flint's community is catapulted into a biomedical conversation about lead poisoning, eco-security and other issues, this pilot study identifies how to expose the intersectionality informing the operation of various processes in Flint's children's lives, and reveals a path to more equitable, communicative and open relationships between academia

[2] I must note that credit for this pithy characterization of the objective of my work in this thesis goes to Kevin Nascimento, an academic colleague.

and communities, even as the number of academic researchers in Flint grows larger and larger as a result of the Flint Water Crisis.

The following research questions guide the work:

(1) Who are the key stakeholders related to children in Flint and how can they be empowered in guiding intervention work appropriately ?
(2) How can Urie Bronfenbrenner's Bioecological Model be applied to research design in Flint?
(3) What challenges are faced in creating Bioecological research in Flint and how can they be overcome?

IDEOLOGICAL AND THEORETICAL ORIENTATION

2.1 Urie Bronfenbrenner

In introducing this thesis, there has been no lack of emphasis on the centrality of Urie Bronfenbrenner's work. Reviewing the work he did across his lifespan as presented in the *Urie Bronfenbrenner Papers Archive* at the Cornell University Library[3], it becomes evident that Bronfenbrenner has always been an activist at heart: one whose academic work has always been political, both explicitly through what he has advocated, and implicitly, in the active reconsideration of his work as it was transformed by application. A journey through his work over half-a-century, beginning in the 1940s through the 2000s, shows that Bronfenbrenner truly worked his way experientially and theoretically towards child psychology.

He started with a truly broad group of interests, including concern for sociometry (the quantitative study and measurement of relationships within a group of people), neuropsychiatry, an early version of drama therapy, personality, ethics, and interdisciplinary and team work in research. These finally coalesced into a formalized focus on issues of social psychology like

[3] This archive presents a full list of Bronfenbrenner's work, including projects and lectures, and can be found at http://ebooks.library.cornell.edu/cgi/f/findaid/findaid-idx?c=rmc;cc=rmc;rgn=Entire20%Finding20%Aid;view=reslist;subview=standard;didno=RMA00954.xml

interpersonal perception towards the early 1960s. (See respectively: Bronfenbrenner 1943, 1944, 1945, 1947, 1948, 1951, 1952, Bronfenbrenner & Devereux, 1952 and Bronfenbrenner, 1958).

It seems, however, that Bronfenbrenner's journey must have begun long before the documentation of it started in the 1940s, as the son of an epidemiologist and doctor of neuropathology who had moved to the U.S.A. from Moscow, Russia, when he was only six years old (Ceci, 2006)— and although Bronfenbrenner had firmly emerged as a researcher of families, child personality and development in the sixties, he also had a very interesting (considering the political climate at the time) side-by-side focus on US-Soviet relationships that became apparent in his work within this and the next decade. Considering child development in such drastically different environments, both recovering from a brutal and hateful war, seemed to have drawn Bronfenbrenner into a variety of sociological, anthropological, economic and political topics throughout the 60s (for example, Bronfenbrenner, 1963 and Bronfenbrenner & Condry, 1970)— including expanding his cross-cultural inquiries outside US-Soviet perspectives (e.g., Devereux, Bronfenbrenner, & Suci, 1962). This sheds light on why and how Bronfenbrenner's work continually embraces cross-cultural lessons in social and developmental psychology, and also accounts for the importance he affords environments in his theory of development.[4]

Indeed, it was within the early part of this decade (the sixties) that Bronfenbrenner, while focused quite heavily on topics surrounding morality and personality, seemed to start considering the 'ecological factors,' i.e., specific environmental correlates, of child development. In a natural progression, it was also at this time that he began to become involved politically in education, working on task forces in child development and advocating for children in the White House,

[4] Bronfenbrenner's cross-cultural work is arguably also pertinent to present political circumstances, wherein it is important and interesting to note that he provides an apt reminder of the tremendous value of the immigrant-outsider perspective, something Ceci (2006) very poetically noted in his obituary for Bronfenbrenner: "…the essence of Urie for me(:) He could be humbly arrogant, advising people on popular culture, matters he usually knew little about. But Urie knew America, and he knew it as only an immigrant can know a place. He recognized the signs of its disarray and chaos, and he knew that its salvation would depend on strong families. As the research piled up showing the family's importance, this became Urie's mantra" (p.174).

leading to his involvement in the Head Start program that had just begun under President Johnson. (See Zigler & Muenchow, 1992, for an overview on the history of Head Start in America.)

Social psychologist Kurt Lewin was another important influence on Bronfenbrenner's work. Lewin advocated for more active and egalitarian approaches in psychology research (for a collection of Lewin's works, see Gold, 1999). Lewin's influence is particularly notable in Bronfenbrenner's work. In fact, Bronfenbrenner's entire ecological systems theory can be considered an expansion of Lewin's person-in-context theory: "B = f (P, E); Where B is behavior, P is the person and E is the environment" (Newbrough, 2013, p.140). Notably, Lewin is known for coining the term 'action research,' describing a research methodology that encourages researchers to consciously design and implement studies that focus on exploring the consequences of *actions;* rather than subscribing to a positivist[5] notion of an objectivity that is "separate from the meanings understood by participants as they act in their world" (Wallerstein and Duran, 2010, p.27).[6]

The resulting *action research*[7] thus viewed subjects of research as real-time influencers of the issues being studied; and held (the assumption) that collaborative sharing of research knowledge with societies *for action* was the frankest method of enabling social transformations through advocacy and structural changes, as it efficiently relied on capacities within the societies themselves. Because of this contribution, Lewin is considered a pioneer of community based participatory research; and his influence on Bronfenbrenner's work begins to thread it together with community based methodology inspiring this work.

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[5] Positivism is a thought system that places high emphasis on the ability of scientific (empirical or logical) verification in validating any assertion. It was established by Auguste Comte, a French philosopher.

[6] Please note that these passages are from a previous work of mine entitled 'New Directions in Community Based Work: Psychological perspectives on the history and practices of community based participatory research.'

[7] Used interchangeably with related terms like action science, organizational action research, etc.

Bronfenbrenner's theories on Human Ecology were becoming increasingly solidified during this evolution, and by the 1980s, he had created a real revolution in psychology, demonstrating that his work, and that of his colleagues, could significantly change the lives of children—Bronfenbrenner recognized that children's lives were also governed by things such as the economy via its definition of work schedules for their parents, and the cultural notions that made communities interact differently in different geopolitical and ethnic contexts —and he had brought this pivotal idea to the forefront of politics, not just academia[8]. Throughout this, Bronfenbrenner remained guided in his work by a methodical frustration over the widespread issue of prioritizing rigor and elegance in experimental design over relevance and scope.

In *Toward an Experimental Ecology of Human Development,* Bronfenbrenner (1977) discusses this frustration along with his discontent over the then common phenomenon of theorists openly shunning psychometric reliability and validity. Bronfenbrenner wanted to study human development, but not in what turn out to be farcical recreations of everyday settings, and nor through the abstract theories of individuals. Thus, he described his own *observational* (rather than interpretational) nested model of the human environment and suggested that people be studied in these (relational, physical and intellectual) domains, and most interestingly, exhorted researchers to give attention to *ecological validity*[9], a measure of how similar to naturally occurring human conditions and activities the experimental setting or theoretical basis is.

Although his theories in the eighties[10] gapingly omitted biological factors; Bronfenbrenner's uncommon lens allowed his work to continue to inch towards including this missing perspective

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[8] An example of this is Bronfenbrenner's submission of a testimony entitled "'Strengthening Families Through Flexible Work Schedules' to the Subcommittee on Employee Ethics and Utilization Committee on Post Office and Civil Service, which is documented in Cornell's archive on him.

[9] "Ecological validity refers to the extent to which the environment experienced by the subjects in a scientific investigation has the properties it is supposed or assumed to have by the investigator." (Bronfenbrenner, 1979, p.29).

[10] Notably, this was a time directly preceding a period of rapid medical advancement, especially in brain research.

rather than stagnating at what appeared to be his peak. An active teacher, activist and researcher, Bronfenbrenner was truly applying the action-research principles of Lewin, and was able to evolve his theories as he looked more closely at families and at children of different ages: recognizing the human implications of major world environmental and technological changes and folding these revelations into his work. Indeed, by the end of the decade, Bronfenbrenner was exploring, up-to-date with the times, issues with biological considerations, like temporality and memory in development (e.g., Ceci & Bronfenbrenner, 1985).

Although the nomenclature of 'Bioecological Model' was only published a few years later in Bronfenbrenner & Ceci (1994), the model as we know it was introduced by Bronfenbrenner in a talk that he delivered at Berkeley following this evolution of the theory; entitled *The Developing Ecology of Human Development: Paradigm Lost or Paradigm Regained?*[11] (Bronfenbrenner, 1989). The lecture sees Bronfenbrenner, characteristically self-critical, speak about his 'failure of success,' noting his suspicion that people inspired by him focus too much on context, and not enough at development. Reminding his students of the importance of those whose shoulders we stand on, Bronfenbrenner (1989) explained in this lecture that he does fundamentally believe that development occurs in the brain and that traditional psychological concepts of cognition and so on are definitely real and useful to him— even if they do not tell the whole story.

However, even after a long, eventful decade of many new discoveries, Bronfenbrenner (1989) once more calls into question research practices which he feels are holding developmental science back during this talk— for example, ignoring statistically insignificant results, using multiple regression to control causal models, employing research tactics that only allow for linear relationships between variables, analyzing research mainly using averaged values (ignoring patterns and variables in the extreme cases), and overstating the scientific importance of correlations and magnitudes of effects. Research, as Bronfenbrenner (1989) was observing it,

[11] The lecture can be viewed at https://www.youtube.com/watch?v=xaQHgVaeKrc.

seemed to be consistently responding to industrial concerns over improvements in theoretical guidance; and this was leading to a steady convolution of the work of developmental psychology.

This brings us to the important point that while Bronfenbrenner's work did revolutionize psychology in many ways, it remains a work in progress—even now, a few more decades into the future, we continue to see in biobehavioral research trends that such factors as white coat syndrome (wherein patients experience anxiety and hypertension upon seeing lab-coats, potentially affecting the nature of their responses and willingness to speak and collaborate— see Den Hond et al., 2003 for more information) despite an expanded conversation about bedside manner and making the lab setting more realistic and comfortable. Perhaps that the problem is not simply the research setting, as Bronfenbrenner (1977) indicated, or even the research methods that Bronfenbrenner (1989) criticized, but the entire research paradigm itself; with its deeply embedded prescriptive and culturally entrenched power dynamics (see Riley et al., 2003, for a summary of evidence of this issue).

This ongoing issue constitutes one of the great motivating factors in this study's adoption of an approach that is both community based and bioecological at the same time— having studied various examples of research demonstrating Bronfenbrenner's idea of the mutually constitutive, reflexive relationships between environments and genetics with humans at their center, as conduits; it appears that applied work in the domain of Bronfenbrenner's conceptual theories tends to require researchers to clearly articulate the many purposes of psychological research, demands collaborative community participation, and ultimately provides knowledge on how flawed research paradigms can be worked within and around to create more meaningful research practices. The rest of this section provides an outline of this theoretical approach and a discussion of various examples of its application.

2.2 The Bioecological Model

The most central and earliest idea of Bronfenbrenner's concept of Human Ecology—the idea that contexts are a crucial part understanding development (although not the only part). Rather than being passive backgrounds for the processes of development, contexts are operative, active participants in development that modify and even generate processes of development. Bronfenbrenner posits that contexts of development are the circumstances and relationships that provide a space (and define the extent of constraints upon such a space) in which development may occur. They are visualized by Bronfenbrenner as actively self-reflexive and self-generative in such a way that each occupies the other in a nested way (he himself compares these to Russian dolls), as shown in the diagram below. (Bronfenbrenner, 1977, 1979).

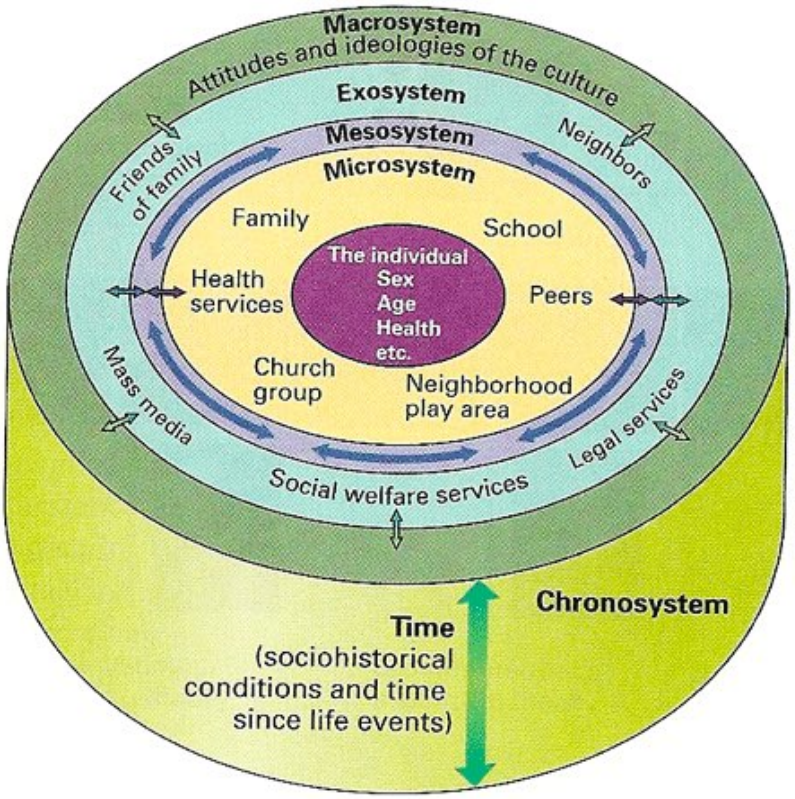

Fig. 1. Context in Bronfenbrenner's Bioecological Model (Source: Santrock, 2007)

Bronfenbrenner has outlined that each of these contexts of development contains economic, social, ecological, biological, and other such capabilities to support an individual's development; and does so in different ways for different people, making them an important aspect

to study when considering the factors affecting the development of humans. As seen in Fig. 1, Bronfenbrenner has named and defined the main contexts of human development: microsystems are in the immediate context of an individual, including their characteristics and the personally related social structures surrounding them; the mesosystem is a context which contains the relationships through which microsystems affect and transform each other so that the impact of exosystems of unrelated (at a personal level) social structures that affect individuals can be understood; while macrosystems, which exist as a result of the interactions between exosystems and mesosystems, present the broader cultural world of actions taken (including resource division) within all the other systems. (Bronfenbrenner, 1977, 1979; Ferguson et al., 2009; Tudge et al., 2009, 2016).

Finally, there are also chronosystems, which consider temporal factors like time between life events, history in general, and the evolution of societies— this is important because in each different time marker we are likely to find a different cross-sectional image of the above systems, which are constantly evolving and accumulating progressively layered information as civilization ages through each individual. (Bronfenbrenner 1992, 1994; Ferguson, 2009; Tudge et al., 2009, 2016).

Practically, these contexts can account simultaneously, as an example, for how historical movements like that of women's suffrage might affect the developmental trajectory of a young girl in the early 20th century, as well as the way in which the age at which she starts school might affect her lifelong accumulation of certain types of knowledge in comparison to others who started school before her (chronosystems); while also demonstrating how cultural understandings of beauty might shape her behavioral development and choice of activities (macrosystem); further breaking down the ways in which accessible institutions, beauty pageants, journalists, governmental scholarship programs and so on would interfere or corroborate with broader cultural trends depending on how the child's family, teachers, friends and so on respond to and are

affected by these things, without forgetting to include the effect of the child's individual genetic and experiential disposition on all of these factors (exosystems, mesosystems and microsystems, including *person* considerations, discussed below)— a very thorough picture indeed.

It is easy, seeing this, to understand why development is envisioned very comprehensively by Bronfenbrenner & Morris (2006) as "the phenomenon of continuity and change in biopsychological characteristics of human beings both as individuals and as groups" (p.793). The aspects of time and biology in this definition of development are crucial, and indeed, these were the pivotal later additions to his theory in the late 80s (as previously discussed). Bronfenbrenner eventually recognized through conducting research in less sanitized, more realistic, ecologically valid settings that *process*, *person*, and *time*[12] needed to be considered in addition to context in order to truly understand development. In Fig. 2, below, the addition of these aspects to the model is visualized.

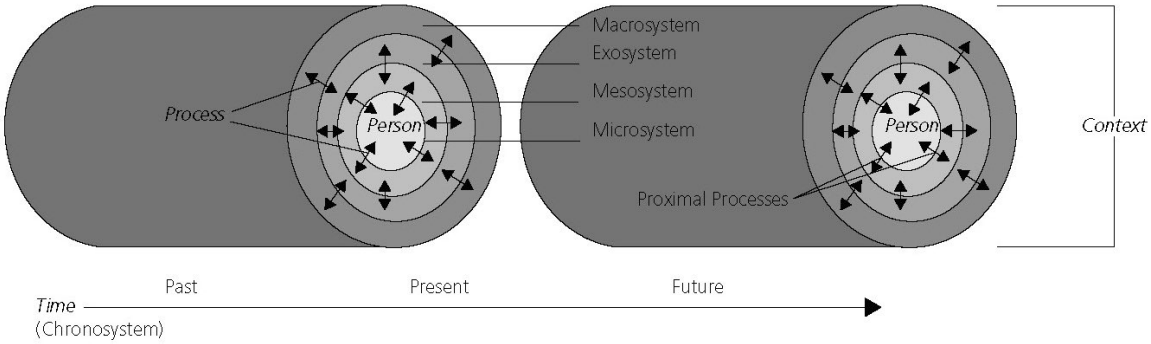

Fig. 2. Process, Person, Context and Time in the Bioecological Model (Source: Ferguson et al., 2009)

The understanding of process is crucial to tying together the biological and chronological aspects of the improved theory. Heavy influenced by Vygotsky, Bronfenbrenner has explained proximal and distal processes as core processes of the child's semantic, intersubjective, interaction

[12] Note that the modern conception of the bioecological theory discusses time as more than simply a context as the chronosystem is, as will be expounded further later on in this section.

with the world that both directly and indirectly mediate the child's development by shaping the various contexts in which it occurs— he has called such processes the "engines of development" (Bronfenbrenner and Evans, 2000, p.118).

Processes, as Bronfenbrenner sees them, build on each other, gaining increasing complexity, similar to how innocent early habits can develop into complex behavioral patterns which finally emerge as distinctive, intricate personalities. In his own words, proximal processes, those processes directly affecting the microsystems of the child, are explained as a core component of development itself:

> Human development takes place throughout life through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate external environment. To be effective, the interaction must occur on a fairly regular basis over extended periods of time. Such enduring forms of interaction in the immediate environment are referred to as proximal processes. (Bronfenbrenner & Morris, 1998, p. 996)

Naturally, processes occur within the general impositions and influences of an individual's systems-contexts, and Bronfenbrenner emphasizes that the role of context, person, and time continue to be important:

> The form, power, content, and direction of the proximal processes effecting development vary systematically as a joint function of the characteristics of the developing person: the environment-both immediate and more remote-in which the processes are taking place, the nature of the developmental outcomes under consideration, and the social continuities and changes occurring over time through the life course and the historical period during which the person has lived. (Bronfenbrenner and Evans, 2000, p.118-119)

To better envision this, consider the example of a habit of walking the same path in woods everyday— although an individual may not change this process much, they are still bound to learn new things from their contexts because different weather, different animals scurrying about, different people like a friend, a parent, a teacher or stranger would interact with them, generating more proximal processes building upon the process of walking the same path in the woods and directly transforming the experience for them causing some kind of development; despite the fact

that the individual set out to have an unchanged experience. Furthermore, we can see that seemingly individual factors are affected by the macrosystem context of culture and systemic accessibility— the process of walking that path in the woods would have different outcomes depending on the different clothes a person chooses to wear based on fashion and wealth, and by distal, or indirect processes, like those of the individual's parents' in choosing whether to give them a water bottle to carry on their walk —another factor that could greatly change the experience of the habitual walk.

Apart from this contextual transformation of process, the person component, which refers to how personal characteristics— both biological (both physical and cognitive) and those emerging from individual processes, like personality, spirituality, morality, wealth, etc. —also influence the way an individual proximally processes the world significantly. This may function within the earlier metaphor of walking the same path in a wood as a matter of personal willpower or perseverance and stamina to keep walking in a pleasant, energetic and happy state of mind; or as a factor of the length of the individual's legs, which would affect the way they pace themselves in their walk and eventually impact what they notice on the walk or how they feel about walking, and so on. Simultaneously, the person component also reminds us that humans affect their environment and behave— an individual's disposition may cause them to pave a path for an easier walk in the future.

Of course, given this reciprocal and focal nature of the person component, there arises a discussion naturally of value-judgements on desirable and undesirable personal traits, which fits comfortably with Bronfenbrenner's focus on morality. The focal nature of the person component also allows, beyond this, for an important discussion regarding Bronfenbrenner's contribution to the important work of tempering and expanding the biomedical perspective that is increasingly prevalent in psychology research today as advances in genetic, neural and other biological data collection have continued at unprecedented rates. Bronfrenbrenner has opposed biological

determinism in thinking about personal characteristics and has highlighted how ecological factors impact biological factors reciprocally, expanding developmental psychology's attention to epigenetics and contributing modern perspectives in the nature vs. nurture debate (Bronfenbrenner and Ceci, 1994).

For example, he hypothesizes effectively, based on various studies by other people, about how strong and weak proximal processes impact heritability and about how the power of this impact can vary across environments:

> Proximal processes raise levels of effective developmental functioning, and thereby increase the proportion of individual differences attributable to actualized genetic potential for such outcomes. This means that heritability (h squared) will be higher when proximal processes are strong and lower when such processes are weak…. [they also] actualize genetic potentials both for enhancing functional competence and for reducing degrees of dysfunction. Operationally, this means that as the level of proximal process is increased, indexes of competence will rise, those of dysfunction will fall, and the value of h^2 will become greater in both instances…[furthermore,] if persons are exposed over extended periods of time to settings that provide developmental resources and encourage engagement in proximal processes to a degree not experienced in the other settings in their lives, then the power of proximal processes to actualize genetic potentials for developmental competence will be greater for those living in more disadvantaged and disorganized environments. (Bronfenbrenner and Ceci, 1994, p.572-579)

Specifically, Bronfenbrenner is explaining above that strong proximal processes create a greater proportion of real developmental outcomes— i.e., actualized genetic potential —thereby creating a greater chance for those developmental outcomes to be inheritable. This further implies that since people living in disadvantaged and disorganized settings have lesser actualized genetic potential/developmental outcomes around them generally (due to having lesser and weaker proximal processes in their lives) compared to those living in advantaged settings; providing strong proximal processes to disadvantaged communities would have a much greater impact on heritability than providing the same opportunities to fortunate communities.

Effectively, this argues that the strength of proximal processes impacts individual biological characteristics through their impact on heritability, which Bronfenbrenner considers as specifically

referring to *actualized*, or observable genetic potential (in other words, this acknowledges that there may be great deal of genetic potential that is simply unknown because there have never been conditions in which it was able to be expressed, but asserts that such unknown potential is not heritable since it can never influence any process or otherwise affect the development of the individual). This indicates, that in bioecological research, biological characteristics are not seen as fixed and deterministic causes of outcomes, but rather, as reflexively active and transformational components of the bioecological system. (Bronfenbrenner and Evans, 2000; Bronfenbrenner and Ceci, 1994).

Inherent to the reciprocity between person, process and context demonstrated above is the idea of time. We see that Bronfenbrenner outlines time as existing historically, periodically and momentarily; and emphasizes that reciprocal relationships and developments within ecosystems are organized through time. These time considerations exist in the larger landscape of chronosystems that were eventually incorporated into the model. The aspect of time in this new model "encompasses change or consistency over time not only in the characteristics of the person but also of the environment in which that person lives (e.g., changes over the life course in family structure, socioeconomic status, employment, place of residence, or the degree of hecticness and ability in everyday life)" (Bronfenbrenner, 1994, p.40). Within the chronosystem, time considerations of micro-time, i.e., the time related aspects of any ongoing situation like duration and interruption, are discernible, as are considerations of meso-time, i.e., aspects like frequency and regularity of situations across different micro-time instances; along with macro-time considerations of the broader socio-historical circumstances that shape such micro- and meso-time aspects. (Bronfenbrenner, 1994; Ferguson, 2009).

In returning to the metaphor of the process of walking, one might add, based on the above, that the individual, walking the path while realizing that leaves fall and clutter the path during the season of Autumn, might recognize, through a temporal analysis of their previous experiences of

walking the path, that they have the power of being able to clean the leaves out of the way; and explain that this can be understood in terms of how it takes a certain amount of periodic experience and an observation of the chronology of events for individual, as well as environmental developments (leaves getting cleaned from the path between seasons) to occur before the fulfillment of the ultimate result of the individual developing a sense of agency over such circumstances can take place. Concurrently, a broader, 'macro,' understanding of time accounts for the fact that the forest is only safe for the individual to walk in today because expanding human settlements have driven all the dangerous wild animals out of it for the last 40 years, showing how events long before the individual's birth can impact their development.

Considering these aspects altogether, Bronfenbrenner's bioecological systems theory can thus be summarized as incorporating "four interacting dimensions… process, person, context, and time… that underlie human development at multiple levels" (Ferguson et al., 2009, p.65-67) in order to (while studying human development) visualize and account for the complex, reflexive, and reciprocal relationships within which development, a process of enduring change that translates across times and contexts, occurs.

2.3 Building Bioecological Research

Having a general foundation in the ideology of the bioecological theory of human development, it is now possible to consider more specifically how Bronfenbrenner intends for his theory to transform research. As he reminds students: "the principal and direct focus of our research program is not on analyzing the development of human beings as such, but on further developing the scientific tools— the theories, research designs, and corresponding empirical findings—that are required in order to improve our understanding of the conditions and processes that shape human development" (Bronfenbrenner & Evans, 2000, p.117).

In creating such a research program, Bronfenbrenner (1997) has indicated that research should focus more on creating relevant contexts in which to study development, establishing in

designing the research the "ecological validity" of the proposed methodology; i.e., evaluating "the extent to which the environment experienced by the subjects in a scientific investigation has the properties it is supposed or assumed to have by the investigator" (p.29). Given that "different kinds of settings give rise to distinctive patterns of role, activity, and relation for persons who become participants in [research] settings" (Bronfenbrenner, 1977, p.109), the "setting becomes ecologically valid for research on human behavior and development only when the following two conditions are met: the psychological and social meaning of the subject's experience in the setting is investigated and becomes known to the researcher, and the subjective meaning of the research situation corresponds to the environmental experience to which the investigator wishes to generalize" (Bronfenbrenner, 1977, p.121-122). Otherwise, the setting may be producing different roles and behaviors than would be produced in the setting the researcher is wondering about—which is obviously undesirable.

Bronfenbrenner (1977) has also explained that the properties of the person, context, processes, and time in ecological research as described above must be viewed as "interdependent and analyzed in systems terms" (p.41) when considering bioecological research, paying attention to relationships, which are formed "whenever one person in a setting pays attention to or participates in the activities of another" (p.41), since this creates dyadic associations in which it is likely that developmental changes will reciprocally affect both members. Observing these dyads also reveals important information about "second-order effect[s]… the indirect influence of third parties on the interaction between members of a dyad" (Bronfenbrenner, 1977, p.68). Particularly, one should not forget in designing such research and considering relationships that "the full interpersonal system operating in a given setting… will typically include all the participants present (not excluding the investigator) and involve reciprocal relations between them" Bronfenbrenner, 1977, p.66).

Simultaneously, regarding the measurement of development, Bronfenbrenner (1977) has emphasized that the changes in thinking/functioning that are being observed must carry "over to other settings" (p.35) and other periods of their lives to be considered development. Furthermore, he has defined that development is reflected in the "the substantive variety and structural complexity of the molar activities which [an individual] initiates and maintains in the absence of instigation or direction by others" (Bronfenbrenner, 1977, p.55); wherein a molar activity is understood to be an "ongoing behavior possessing a momentum of its own and perceived as having meaning or intent by the participants in the setting" (Bronfenbrenner, 1977, p.45).

Regarding heritability and the biological components, Bronfenbrenner has explained that it is advisable to use "heritability measures as a criterion for assessing the power of a given theoretical model. Such wider use becomes possible with the development of new mathematical models that permit estimating genetic components not only for developmental outcomes, but for all components of the theoretical model, plus the use of siblings rather than twins… The results will tell us which genetic potentials are being actualized, for better or for worse, under the given conditions of 'process, person, context and time" (Bronfenbrenner & Evans, 2000, p.119).

Considering these positions together, one might create different types of experiments rooted in bioecologial theory by systematically contrasting various "environmental systems or their structural components, with a careful attempt to control other sources of influence either by random assignment (planned experiment) or by matching (natural experiment)… [or a] transforming experiment involves the systematic alteration and restructuring of existing ecological systems in ways that challenge the forms of social organization, belief systems, and lifestyles prevailing in a particular culture or subculture" (Bronfenbrenner, 1977, p.36-41).

2.4 Past Bioecological Research

Tudge at al (2009, 2016) provide an excellent literature review of bioecological research work conducted since the publication of Bronfenbrenner's most mature, bioecological model.

They focus on evaluating "the extent to which contemporary scholars are appropriately using Bronfenbrenner's theory in its developed form in the design of their studies" (Tudge et al., 2009, p.202), arguing that that applying theory correctly in research is extremely important, since "failure to do so means that [the theory] has not been tested appropriately; data apparently supporting the theory do no such thing if the theory has been incorrectly described, and, by the same token, a misrepresented theory is impervious to attack from non-supportive [sic] data" (Tudge et al., 2009, p.206).

Tudge et al.'s (2009, 2016) findings are dismal: with them finding that only 4 out of the 25 studies were appropriate bioecological studies in 2009, and only 2 out of 20 in 2016. They attribute this to non-standardized theoretical training in graduate schools of social sciences and a general lack of explicit demands upon students to base their research and statistical analysis strongly and rigorously in theory.

Furthermore, they emphasize that "theories such as Bronfenbrenner's might be particularly prone to misrepresentation and a lack of appropriate evaluation" (Tudge et al., 2016, p.429), and break this assertion down, explaining that the bioecological model is "a contextualist theory that is too often treated as though it fits within a mechanist paradigm[13]" (Tudge et al., 2016, p.429). They advise that "given differences at the ontological and epistemological levels, there also should be equivalent differences at the level of method,[14]" or "in other words, [that] any research that reduces Bronfenbrenner's theory to the independent effect of context on development is misguided, treating his theory as mechanist rather than contextualist" (Tudge et al., 2016, p.431).

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[13] Tudge et al. (2016) reference Pepper (1942) at this point to demonstrate the main worldview of psychology— mechanism (the view that beings are like machines with unrelated components that work together when given an external impetus), organicism (the view that beings are inherently whole and their nature is essential rather reactive), contextualism (the view that beings can only be understood in terms of their contexts, and that the semantic/contextual world that we live in informs their developmental behavior).

[14] They argue that mechanists would focus only on one variable, excluding all others, and not really looking at interactions between variables as places that new synergetic properties emerge in the way Bronfenbrenner does.

They also state that the theory may be "viewed as simply too difficult to translate effectively into research" (Tudge et al., 2009, p.207), acknowledging that Bronfenbrenner never provided clear guidance on applying his theories, and that the model appears to necessitate massive and difficult studies: "if one considers designing a study that includes each and every aspect of the theory, the research would indeed be a large and complex study." However, they also assert that including everything is unnecessary, and that the only stipulation provided by Bronfenbrenner regarding study design was that any study "involving the PPCT model should focus on proximal processes, showing how they are influenced both by characteristics of the developing individual and by the context in which they occur and showing how they are implicated in relevant developmental outcomes" (Tudge et al., 2009, p.208).

The studies that met Tudge et al.'s (2009, 2016) criteria for successful bioecological research simultaneously investigated "all four elements of the model" (Tudge et al., 2009, p.200) —Process, Person, Context and Time; and studies "in which the methods and analyses are appropriate to the theory and in which the hypotheses to be tested are theoretically derived" (Tudge et al., 2016, p. 440). Furthermore, appropriate studies build on the theory of the bioecological model, such as one study in which researchers furthered Bronfenbrenner's theories about the synergistic effects of processes across multiple *similar* contexts by showing that processes across multiple *differing* contexts can also produce synergistic effects— e.g., processes repeated in peer microsystems and in family microsystems have synergistic effects, not just processes in multiple family systems. (Benson and Buelhr, 2012; Tudge et al., 2009, 2016).

On the other hand, Tudge et al. (2009, 2016) warn against some common mistakes that they have observed, such as omitting proximal processes altogether from design or only focusing on older writings; limiting the theory to only contextual effects on development; focusing on a single nested system; focusing on contextual or individual influences only and not any proximal processes; omitting time from research design; looking at person upon context interactions less

than context upon person influences and discussing proximal processes and time as merely contextual/environmental factors.

They also remind us that there are "'critical difference[s]' between analyses relevant to the bioecological model and other analytic designs… the most common… is the linear multiple regression model. This model provides estimates of the 'independent" effect of each factor included in the research design. . . . [but] as [Bronfenbrenner] spelled out elsewhere, the multiple regression model, as typically applied in psychological research, requires the assumption that the various factors affecting the outcome operate independently of each other and that, therefore, their combined effects can be only additive" (Tudge et al., 2016, p.441). They suggest for this reason that structural equation modeling and person-centered approaches which "integrate multiple aspects of development and capture the coherent structure of individual functioning" (Tudge et al., 2016, p.442) should be used instead of multiple regression.

Apart from these critiques, Tudge et al. (2016) also highlight a particularly tricky mistake that researchers make in designing bioecological research:

> In many cases, we found that some or all of the theory's main concepts were described, but the study variables were apparently draped onto whichever of the concepts seemed to be the best fit, without an attempt to test or evaluate the theoretically driven relations among the concepts. This "coat hanger" use of a theory seems more appropriate than one in which the theory itself is misrepresented, because the relevant concepts are mentioned. However, assessing the process aspect of PPCT requires more than just studying an interaction; person and context components have not been considered appropriately simply because people are being studied in one or other context; and merely because a study is longitudinal, it does not necessarily meet the time requirement. (Tudge et al., 2016, p.440)

While Tudge et al. (2016) emphasize the need to derive hypotheses from theoretical substance in order to avoid this mistake, arguably, such mistakes arise in some part from a lack of understanding of the communities being studied. After all, proximal processes and their contextual outcomes differ intersectionally across economic, cultural, gender and racial lines, to name just a few, because, as Tudge et al. (2009) have noted: "context, too, influences proximal

processes, and the minimum requirement would be to evaluate the differential influence of two microsystems (home and school, for example) or two macrosystems (middle- and working-class families or adolescents from different cultural groups) on the activities and interactions of interest" (p.202).

Furthermore, Tudge et al. (2009) emphasize the role of identifying "the personal characteristics that individuals bring with them into any social situation… [dividing] these characteristics into three types… demand, resource, and force characteristics[15]" (p.200) in building bioecological research: "to understand how Person characteristics influence those proximal processes, the minimum requirement would be to assess the ways in which a demand characteristic, such as age, appearance, or gender, altered these activities and interactions, although a richer design would examine the ways in which relevant resource or force characteristics of the study participants influenced the ways in which they acted and interacted" (Tudge et al., 2009, p.202). All of this clearly suggests that a deep awareness of the participants is necessary in bioecological research.

Lastly, even the broader characteristics of the community represented in the chronosystem can sometimes be closely guarded cultural knowledge; and gaining an understanding of them can require close connections to be built between the researcher and the community long before the research is designed. Even when considering the simple temporal aspect of repeat contact in a

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[15] This is a redefinition of the term 'demand characteristic' which more conventionally refers to experimental artifacts. Bronfenbrenner's version indicates that "Demand characteristics are those to which [Bronfenbrenner] had referred in earlier writings as "personal stimulus" characteristics, those that act as an immediate stimulus to another person, such as age, gender, skin color, and physical appearance. These types of characteristics may influence initial interactions because of the expectations formed immediately. Resource characteristics, by contrast, are not immediately apparent, though sometimes they are induced, with differing degrees of accuracy, from the demand characteristics that are seen. These are characteristics that relate partly to mental and emotional resources such as past experiences, skills, and intelligence and also to social and material resources (access to good food, housing, caring parents, educational opportunities appropriate to the needs of the particular society, and so on). Finally, force characteristics are those that have to do with differences of temperament, motivation, persistence, and the like." (Tudge et al., 2009, p. 200).

longitudinal study, developing a strong relationship with the community seems methodologically crucial, as the strength of the connection will be important in eliciting follow-up participation.

When these factors are considered, it becomes clear that intersectional knowledge of the participant community is central to the work of designing appropriate bioecological research, and it is no stretch to suggest that some of the mistakes pointed out by Tudge et al. (2016) of the "draped"/"coat-hanger" (p.440) type may be on account of abstract, fractured, insufficient or in the worst case, non-existent relationships with participant-communities. Indeed, Lerner (2006) has emphasized this point, explaining that:

> Finally, our designs should be informed not just by colleagues from the multiple disciplines with expertise in the scholarly study of human development. Our methods should be informed as well by the people and communities we study… They, too, are experts about development — a point our colleagues in cultural anthropology, sociology, and community youth development research and practice have been making for several years. Most certainly, participants in our community-based research and applications are experts in the character of development in their families and neighborhoods. Accordingly, *research that fails to capitalize on the wisdom of its participants runs the real danger of lacking authenticity* and of erecting unnecessary obstacles to the translation of the scholarship of knowledge generation into the scholarship of knowledge application. (Lerner, 2006, p13, emphasis mine)

2.5 Perspectives from Community Based Work

The bioecological model necessitates community-based intersectional research. While a full consideration of the debts owed to proponents of community-based work is not within the present scope, it is important to summarize some guiding features of community based work in explaining the ethos of the research design in this study: community based work is rooted in the spirit of social justice; it is based on community issues and systems, and serves community development and community driven outcomes; and it is a cooperative, egalitarian and empowering process of co-learning. (See Hacker, 2013; Jason et al., 2015; Minkler & Wallerstein, 2011 and Stoecker, 2012 for more information on community based work.)

Methodologically, community based work covers many grounds in terms of guiding qualitative, quantitative and mixed methods research appropriately. In this pilot study, two community based methodological practices are particularly relevant: the Delphi Method and Grounded Theory. Additionally, although it is not traditionally considered a research methodology, the process of mapping community capacities, a key concept of community based work, is also particularly relevant to this study. (Jason et al., 2015 and McKnight and Kretzmann, 1997).

There are debates surrounding the compatibility of community based research methodology with the Bioecological Model and Urie Bronfenbrenner's recommendations for research design, particularly in terms of whether such work simply constitutes what Wallerstein and Duran (2010) have called a "pragmatic use of knowledge" (p.25) rather than a complex, community focused agenda that demotes the importance of independent theory and researcher objectives in the face of community driven objectives of inquiry. However, each of these community based work concepts and methodologies, as explained below, is arguably aligned with Bronfenbrenner's postulations regarding Bioecological research methodology, and provides an effective contextual framework for research that proves his theories— and indeed, as McLeroy et al. (2003) have observed "increasing attention is being paid to ecological perspectives in community-based interventions" (p. 531) due to this (see also Merzel & D'Afflitti, 2003).

Additionally, it is arguable that because the research— aligned with the study's goal of finding a path to more equitable, communicative and open relationships between academia and communities as outlined in the introduction —will first consider issues pertinent to the community when bioecological research is approached through community based methods, it will inherently elevate the community agenda over the researcher agenda, with the final outcome, through the researcher's consolidation of their agenda with the community driven one, of unifying both community and researcher objectives.

2.5(a) The Delphi Method

The standard Delphi Method features "purposive sampling, emergent design, anonymous and structured communication between participants, and thematic analysis;" and serves to allow researchers to "solicit feedback from very different groups of people, each with a unique lens or expertise on an issue;" usually in sample sizes of "of between 10 and 20 participants" Expertise of participants "must be defined with predetermined criteria (e.g.,, years of experience working in an area, years spent living in a community" (Brady, 2015, p.62).

Data is usually collected via questionnaire in three waves: the "first wave includes an initial questionnaire, usually between 7 and 10 questions, followed by a second wave that provides all participants the opportunity to provide feedback to the responses of others, and concluded by a final, third wave questionnaire that is developed from the consensus opinions analyzed in Wave 1 and 2 in order to arrive at a final consensus on a question, topic, or issue" (Brady, 2015, p.62-63). In qualitative Delphi studies, thematic analysis to "identify the consensus opinions or themes present in participant responses to questions"(Brady, 2015, p.63) is conducted thereafter, using preset criteria to decide what constitutes consensus.

The Delphi Method is especially relevant to the type of experiment that Bronfenbrenner (1977) has described as a "transforming experiment [which] involves the systematic alteration and restructuring of existing ecological systems in ways that challenge the forms of social organization, belief systems, and lifestyles prevailing in a particular culture or subculture"(p.41). By providing an avenue of participation to the gatekeepers of cultural and organizational structures, the Delphi Method allows for a transformational experiment to be modeled while also serving as a conduit for the transformation; the methodology integrates the community based and participatory aspects of Bioecological research.

However, given that the current undertaking is to generate an understanding of the community in which to ground *future* Bioecological research, the Delphi Method has not been

applied in a traditional sense to this study. Instead, it has provided vital inspiration in generating a pilot research plan that underscores the participatory intentions of this research work. Apart from pushing the study towards questions about how to identify relevant community entities from whom feedback should be solicited, informing the tiered design and the sampling and recruitment strategy of this study, the core practices of the Delphi Method have also had a strong influence on the vision for the overall study beyond the pilot, as will be discussed later.

2.5(b) Grounded Theory

Grounded Theory approaches to research "emphasize developing theoretical frameworks that arise from close examinations of participants' narratives and behavior … [and incorporate] bottom-up qualitative approaches, in which findings are emergent from data" (Rasmussen et al., 2015, p.23). The theories arising from data can be "substantive," if they are specified to an operational area of inquiry or "formal," if they are specified to theoretical concepts (Rasmussen et al., 2015, p.23).

Grounded Theory practices can involve "ignoring a priori knowledge of the topic;" exploring "sensitizing concepts… [i.e.,] those interests, thoughts, and hunches that researchers have before they get started doing research… they are not formal theories;" practicing "reflexivity…[which] involves active self-reflection upon researchers' own subjectivity in an attempt to make biases explicit and examine how these biases might influence findings; " or "working with research collaborators." (Rasmussen et al., 2015, p.23-24).

Sampling strategies include theoretical sampling, an emergent, "purposive sampling process in which researchers select participants and groups for comparison in order to generate categories of meaning in their data…This means that data analysis must begin as data collection does…It is an iterative process… [and is] "inductive and contingent"… [i.e.,, it uses] initial analyses of data to direct further selection of participants. Participants are recruited until conceptual categories of data reach a point of "theoretical saturation," or a point where "no additional data are being

found whereby the sociologist can develop properties of the category" (Rasmussen et al., 2015, p. 24).

Data analysis primarily follows the "constant comparative method… [of] four stages: (a) comparing incidents applicable to each category, (b) integrating categories and their properties, (c) delimiting the theory, and (d) writing the theory" (Rasmussen et al., 2015, p.24).

As we have seen from the useful critiques of Tudge et al. (2009, 2016), bioecological research is most productive when it is actively proving the model (e.g., rather than coopting it into new theoretical models)— this presents an illusion of incompatibility between bioecological research and Grounded Theory, since the latter is clearly atheoretical.

However, in considering Bronfenbrenner's (1977) exhortation that to create ecological validity "the psychological and social meaning of the subject's experience in the setting is investigated and becomes known to the researcher, and the subjective meaning of the research situation corresponds to the environmental experience to which the investigator wishes to generalize" (p.121-122), it is arguable that designing research that is truly compatible with the Bioecological model must be preceded by a process of converting grounded substantive theory into grounded formal theory.

Furthermore, while the theoretical concerns of the Bioecological model are generally inescapable as described above, we have seen that in encompassing various personal components, broad contexts, types and proximities of processes, as well as multiple modalities of time, they are expansive enough that community based research agendas and their variety of practices can comfortably fit within them, as Onwuegbuzie et al. (2013) have discovered:

> As co-editors and first-round copyeditors of Research in the Schools (Anthony J. Onwuegbuzie and Rebecca K. Frels), former editor of Educational Researcher (Anthony J. Onwuegbuzie), guest editor of previous International Journal of Multiple Research Approaches special issues (Anthony J. Onwuegbuzie, Kathleen M. T. Collins, and Rebecca K. Frels), editorial assistant/production editor of Research in the Schools (Rebecca K. Frels), and reviewers for and editorial board members of numerous journals, we have had the opportunity to review hundreds

> of quantitative, qualitative, and mixed research articles over the years. And this experience has led us to identify a theoretical framework that incorporates virtually all research… Specifically… Bronfenbrenner's ecological systems theory. (Onwuegbuzie et al., 2013, p.4)

The main issue that would remain in ensuring that the research is community based would in fact be posed by the biases of researchers guided by publishing trends and professional concerns rather than community issues— which is specifically what Grounded Theory practices aim to avoid. Thus, incorporating Grounded Theory practices into the design of this pilot study exploring how to correctly build Bioecological research is beneficial.

2.5(c) Mapping Community Capacities

In a larger text about community organizing, McKnight and Kretzmann (1997) propose that in towns like Flint, where "massive economic shifts that have marked the past two decades. Hundreds of thousands of industrial jobs have either disappeared or moved away from the central city and its neighborhoods… new approaches to rebuilding their lives and communities, new openings toward opportunity, are a vital necessity," (p.171). They explain further that these natural deficiencies of communities in transition are often mislabeled as permanent special needs by governmental actors, who:

> Codify and program this perspective through deficiency-oriented policies and programs. Then, human service systems—often supported by foundations and universities— translate the programs into local activities that teach people the nature of their problems and the value of services as the answer to their problems…gradually, they become mainly consumers of services with no incentive to be producers. Consumers of services focus vast amounts of creativity and intelligence on the survival-motivated challenge of outwitting the "system" or on finding ways—in the informal or even illegal economy—to bypass the system entirely… when deficiency- and needs-oriented programs come to dominate the lives of neighborhoods where low-income people reside. (McKnight and Kretzmann, 199, p.171-172)

Instead of such deficiency based programming, McKnight and Kretzmann (1997) urge community based workers to focus on identifying, highlighting and building upon community capacity. For example, in mitigating the issue of malnutrition in a community, this might mean supporting local food-oriented businesses to expand into the health-food arena so that the entire

community can contribute to a sustainable culture shift towards healthy-eating, rather than simply establishing an isolated healthy-school-lunch program in which children are forced to be no more than passive consumers of public welfare.

McKnight and Kretzmann (1997) outline a process through which to map such *community capacities*, inviting research into individual talents and capacities (including people with disabilities and other labels), personal income and expenditure, local businesses and home-enterprises, local unions, associations, organizations and institutions (political, financial, cultural, faith-based, media/communications); and to map *community resources,* inviting workers to identify local institutes of higher education, hospitals, social service agencies, non-profits, public schools, police and fire departments, libraries, parks, vacant land and structures, local waste and utility solutions, accessible public information.

Apart from being a strategy well suited to the economic landscape of Flint, mapping community capacities is also important because it provides a system through which to contextualize the extents of influence held by prominent community actors and arms. By providing important contextual and historical information, as well as information on personal demand, resource and force characteristics that suggest how and where less obvious reciprocal dyadic associations may exist or be emerging, and revealing the circumstances in which they operate, mapping community capacities can be understood as an integral step in meaningfully identifying pivotal processes within communities, providing the necessary foundation for developing strong Bioecological research.

THE RESEARCH PROCESS

3.1 Pilot Study Design and Methods

3.1(a) Conception of study and access to the sample

This research on the Flint Water Crisis in Flint, MI was conceptualized and conducted in New York City based on the researcher's connection to the community of Flint through her employment as a paralegal at Levy Konigsberg, LLP, a law firm representing over a thousand children affected by the Flint Water Crisis in individual personal injury lawsuits.

Although the research commenced only after both the generous authorization of the law firm to use archival data from their records and recruit participants from their client roster, and the approval of Sarah Lawrence College's institutional review board in February 2017, the researcher had ongoing in-person and phone contact with individuals in Flint, MI starting in February 2016 through her occupational duties of outreach to prospective clients, client-relationship management and collecting personal, demographic and health information from clients relating to the Flint water cases.

The earliest impetus to conduct research in Flint emerged from reflections upon the simultaneously distressed, resilient, fearful and hopeful conversations between the researcher and the people of Flint through this vocational connection.

3.1(b) Evolution, Intentional Flexibility and Purpose of Pilot Study

This research was initiated with a fairly different vision, although its community based intentions and affiliation to the work of Bronfenbrenner remained unaltered. Based upon reflections on previous contact with the study population, the following guiding impressions and experiences shaped the initial form of the research:

(1) Parents and doctors have already observed a marked increase in behavioral and health issues in young children in Flint, and many are concerned about a lack of systems in place to manage these challenges faced by their children.

(2) Parents feel that the previous lack of information regarding the relationship between lead poisoning and the changes in their children's learning and behavior have led them to

attribute these changes to other factors, and are worried about the impact of misdiagnosis on the efficacy of the management of the changes in their children.

Considering these perspectives alongside the researcher's background in developmental psychology, the initial vision for the project surrounded questions about what development as a concept constitutes, and how this conception not only informs, but fundamentally shapes the scope and praxis of the professionals in Flint dealing with the issues described above. In this iteration of the project, the bioecological model was used to provide in order to provide a theoretical lens through which to consider the complexities of the community and to propel the study into an interdisciplinary discussion.

However, the focus on community based work was just as strong in that early concept as it is in this one; with considerations of a variety of approaches to knowledge generation found outside of traditional psychology research in order to (1) enable discourse that ties values central to communities together with academic goals and the work of researchers; and (2) foster the realignment of academic attitudes towards the validity and nature of research data emerging from within communities.

Thus, even in the earliest steps of research design, a flexible, community-directed model based on Grounded Theory practices, the standard Delphi method and considerations of community capacity was espoused: 'expert' participants were sought out alongside parent participants, the study was tiered so that initial participation could inform and edit that final design and content of the work, and effort was made to methodologically elevate participant voices over the theoretical and epistemic concerns of the study.

Because of this orientation, it was easy to remain open to moving the study in new directions. A combination of timing issues including delays in gaining approval from both the law firm and the institutional review board to commence the study, slower recruitment than predicted, and the requirement to meet fixed academic deadlines; a reflective acknowledgement of the biases

present in the in the original design; and a process of intellectual development leading to a deeper consideration of the bioecological model and its implications for research design ultimately compelled minor but pivotal changes in the vision and continuing design of the study.

These changes included allowing for a bifocal pilot process of textual and semi-structured interview research that allows for key community actors to be identified and collaborated with in the process of mapping community capacities, and advancing the bioecological model from its previous background/contextual role to one that guides the continuing design theoretically. The survey arm of the reformed bifocal pilot process continues to function as an instrument of collaboration between the community and the researcher and retains its original form, but the goal of the process has moved away from its original role in discovering community conceptions about development to a role strictly concerned with gaining participatory insight from the community and improving the researcher's intersectional understanding of the community.

3.1(c) Ethical Compliance, Confidentiality and Consent Procedures

Ethical Compliance

The researcher took care to factor in a process of self-education regarding research ethics in the process of developing this research. Corresponding with the community based ideology of this work, consideration of ethics and equitability was a priority in this study.

Apart from self-education, in order to be prepared to conduct research ethically, the researcher completed a NIH Web-based training course entitled "Protecting Human Research Participants" and a Collaborative Institutional Training Initiative training course of 14 different quizzed modules surrounding the topics of research ethics, basic Institutional Review Board regulations, conflicts of interest, informed consent, privacy and confidentiality, international research, research with children and involving other vulnerable participants.

Ethical compliance in the research design was ensured via submitting the research procedures for a full review by the Institutional Review Board of Sarah Lawrence College and revising study procedures based on their recommendations.

Legal Confidentiality and Permission to use Client Data

The law firm has explicitly explained to clients during retaining that their information will be used in various ways to assist in the litigation of their lawsuit. Legal regulations stipulate that confidentiality of such data should be maintained, limiting sharing of information for purposes not approved by the lawyers (although clients are aware that their information will be shared with various approved actors throughout the process).

However, this study and the researcher/paralegal's work related to understanding the specific circumstances of the families being represented has been identified by her supervising lawyers as directly benefitting the litigation by informing the lawyers on how to create damage models that accurately represent the breadth of effects of the Flint Water Crisis on the families' ability to thrive. Thus, using legally confidential client information for the purpose of this study is permissible, with the expectation that the ultimate write-up will not include any individually identifying information.

Protection of Study Data and Participant Confidentiality

In order to secure participant data and maintain confidentiality, several procedures were applied:

- The phone call data was stored on a password-protected laptop with an encrypted hard-drive under participant IDs for which the assignment is known only by the researcher.
- A password protected document recording the ID assignments was stored on a separate hard-drive within a hidden folder.
- No one except the researcher has access to the transcripts of the phone calls or any recordings that were obtained.

- Any phone interview data from non-client participants shared with the law firm and during publication will be in the form of an overall, aggregate, anonymous summary or paraphrased quoting of the views represented within the interviews.
- Client-participant information will be shared non-anonymously with the law firm if deemed beneficial to the client's case; however all client-participant data shared in publication will also be in the form of an overall, aggregate, anonymous summary or paraphrased quoting of the views represented within the interviews as with community participants.

Consent Procedures and Protection of Participant Rights

Informed consent for the pilot study was requested via oral script on the telephone. Every effort was made to ensure that the consent scripts were in clear language and demanded emphatic, unambiguous consent in order to validate consent. In order to ensure that participants had a summary of the informed consent information including contact details for reporting to the IRB easily available to them, participants were also emailed this information prior to the phone interview.

The participants were informed about the potential risks that they might face due to participation—namely that the questionnaires may cause participants emotional distress since they discuss the events of the Flint Water Crisis, which has been a traumatic experience for many.

Participants were also adequately warned that given the nature and scope of the study, there will be no opportunity for clinical or therapeutic intervention in case of such distress, and reminded that they had the right to skip any question or to discontinue participation in the study entirely at any time without affecting their participation in the raffle.

The conversation about consent also included information on the duration of the study, about the measures taken to protect their privacy and the security and confidentiality of their data, and a reminder to report any misconduct on the part of the researcher to the IRB. During the

informed consent conversation, participants were also informed that while they would not directly benefit from participating in the study, their participation could add to important knowledge that could help many people.

In order to ensure that the participants were engaged in the informed consent process, they were encouraged to ask questions they may have had about the study based on the informed consent guidance presented to them, and the researcher would not proceed to the survey questions unless the participant had answered two separate questions confirming that they were both comfortable with proceeding and ready to proceed. Additionally, to ensure that participants were comfortable throughout the process, the researcher made it a point to frequently check whether the participant was comfortable moving on to the next questions during the interview.

3.1(d) Sample Selection and Recruitment Procedures

As established in the Ideological and Theoretical Orientation/Contextual Frameworks section, mapping community capacities and putting community actors, including professionals, in conversation with each other are integral components of this project. A sampling strategy that is at once inclusive, collaborative, purposive and emergent is key to realizing this vision of the study.

The influence of the Delphi method on this study can be seen in the purposive sampling strategy of including both parent and 'expert' participants (professional or otherwise influential community members) in the pilot sample for collaboration-oriented surveying. In terms of defining expertise, however, a move away from the standard Delphi method and towards the Grounded Theory practice of theoretical sampling can be seen in the pilot study design.

Given that the pilot study is attempting to also explore in broader terms the intersectionality defining various community perspectives, capacities and processes while simultaneously fostering a positive relationship with the community amongst its collaborative goals, the pilot study can be viewed as generating an understanding of what kinds of expertise exist in the community in and of itself— an iterative and inductive process of generating categories is a hallmark of the

theoretical sampling approach. Thus, generating a tight criteria for expertise within the sampling strategy would be premature, and instead, a loose definition of expertise as encompassing all individuals who are willing to report on their non-personal (e.g., parent), communal roles is espoused for the pilot. In the continuation of the study, the expertise may be categorized more concretely.

All parent participants for the study were recruited from within the client roster of Levy Konigsberg, LLP, the employer of the researcher/paralegal. By default, this sample consists only of individuals who have lived in Flint since at least the beginning of the water crisis in 2014, because the intake criteria of the law firm excludes individuals who were not exposed to the crisis.

Community participants were recruited via email, social networking, and physical flyers posted at local businesses. Identifying community participants to recruit involved the previously described process of mapping community capacities and responding to emergent data from the pilot interviews.

Recruitment of parent participants was conducted via email invitation, displayed flyers in the local Flint offices of the law firm, and through a handout of flyers in-person by the researcher at the Flint Children's Museum, during an informal event in December, 2016 organized by the law firm to provide an opportunity for parents to learn more about the litigation and to offer a developmentally appropriate setting for accompanying children. This event was organized as a team effort with the partners, departmental heads, museum staff, and department staff, including the researcher/paralegal.

As an incentive, participants were informed that their at-will participation would automatically enter them in a raffle to win one of three amazon.com gift cards of $100 each at the completion of the study.

3.1(e) Semi-Structured Pilot Phone Interview Design and Procedures

The pilot study phone interview design was based on Grounded Theory approaches, as well as with consideration to the established modality of the researcher/paralegal's preexisting vocational connection with the participants.

Although a consistent set of questions with consistent wording are necessary to establish points of contrast and consensus, in keeping with Grounded Theory expectations that the ontology of research should arise from the data itself rather than be imposed by a theoretical definitions built into the design, it is important that data collection processes be flexible and accommodating to variations in participant engagement and to participant driven expansion. Additionally, considering the various power modalities and conventions assumed in research situations, it can be expected that some participants may await interviewer prompting to discuss completely their opinions, creating a need for the process to also allow for interviewer follow-up and feedback questions where interactions appear to demand them. Accordingly, a semi-structured interview style was adopted.

Simultaneously, in keeping with the collaborative intentions of the survey arm of the pilot study, the allegiance of the study to the goal of generating equitability in research relationships, and the tiered model of requesting follow-up participation, it was important for the data collection process to foster a personal connection leading to a warm, collegial and open relationship between participants and the researcher. Considering the geographic distance of the researcher, face-to-face interviews were not be possible by-and-large, but it was hypothesized that a comparably tangible and personal interaction could be achieved via telephone.

A study on participants' impressions of phone interviews by Ward et al. (2015) revealed that "[their] participants viewed interview via telephone as a favorable experience" (p.2781), with the themes of "being 'phone savvy; concentrating on voice instead of your face; easy rapport; and not being judged or feeling inhibited" (p.2775) marking their experiences.

Meanwhile, in a study on the advantages and disadvantages of various interview formats, Opdenakker (2006) has discussed circumstances in which telephone interviewing is ideal, which can be seen to fit particularly well with the needs and limitations of the pilot study:

> Using telephone interviews for collecting information are preferred, when:
>
> • social cues of the interviewee are less or not important information sources for the interviewer (of course dependent on the research problem);
>
> • the interviewer has a small budget and less time for traveling;
>
> • looking for access to people on sites, which have closed or limited access (such as hospitals religious communities, prisons, the military, and cults);
>
> • standardization of the interview situation is not important;
>
> • some anonymity is requested

Finally, because a bulk of the researcher's prior contact with the sample was via phone call, this modality was assessed to be one that would be comfortable and familiar for both the researcher and the participant.

Thus, the 5-7 question pilot study surveys were designed to be collected through semi-structured phone interviews, and an interview script and guide detailing strategies to foster warmth and empower participants, as well as maintain an ethical approach and style, were developed (see appendices). Although the design of the study involved consensual recording of the phone interviews, due to strict US laws and regulations regarding phone call recording, the process of call-recording ended up being very difficult and prohibitive, involving a call back through a third party and thus leading to understandable participant concerns about the security of their provided data. Instead of audio recording, given this situation, the interviews were simply transcribed on the spot, requesting participants to speak slowly and allow pauses for transcription.

3.1(f) Data Analysis Procedures and Grounded Theory

Immediately after each interview, the researcher additionally noted reflections on the scheduling process, interview process, and interview content next to the transcription. Before conducting data-analysis on the full data set, sensitizing concepts were identified based on notes from the initial four interviews, and notes on documentaries and articles about the water-crisis response found during the process of research for community capacities mapping, as well as reflections on a wide-range of prior and ongoing community-contact experiences outside of the research paradigm. Sensitizing concepts "[refer] to those interests, thoughts, and hunches that researchers have before they get started doing research. They spark researchers' thinking about a topic… although they do not guide it per se….provide a place to *start* inquiry, not to end it… the point… is that they are not formal theories, while at the same time they acknowledge that researchers are not without ideas and interests prior to examining data" (Rasmussen et al., 2015, p.23).

The sensitizing concepts thus identified were:

(1) tensions and accessibility concerns surrounding racial-inequality in Flint,

(2) pervasive distrust in the community surrounding figures of authority, and

(3) a need for resources and assistance to help families cope with the changing behaviors and needs of lead poisoned children.

Once seven interviews were conducted, the data was qualitatively analyzed following the "iterative process of data coding and analysis" (Garrison et al., 2013, p.2) that is espoused in the "constant comparative method… [of] four stages: (a) comparing incidents applicable to each category, (b) integrating categories and their properties, (c) delimiting the theory, and (d) writing the theory" (Rasmussen et al., 2015, p.24), a principal feature of Grounded Theory work.

In order to obtain incidents from the data, first, the transcript of each interview was read line-by-line, and each line was summarized with a few words. Such summarizing is a process of coding, or "the process of applying a label for a category of meaning to a section of text (i.e.,,

indicator). In Grounded Theory, coding is (a) bottom up, that is, not based on a priori categories, and (b) an iterative process" (Rasmussen et al., 2015, p.25).

Rasmussen et al. (2015) highlight that "it is here that the idea that theory actually can emerge from data is most credible. Line-by-line coding 'forces the researcher to verify and saturate categories, minimizes missing an important category, and ensures relevance by generating codes with emergent fit to the substantive area under study" (p.25). Through this process of line-by-line coding, the phone interviews were broken down into distinct data incidents/data events by identifying key phrases (e.g., "it's hard to handle it") and words (e.g., "school") that describe distinct entities and experiences within the interview to serve as labels for categories of meaning within each line.

These data events from each interview were then compiled and pruned to identify unique data events across the sample, through a process of comparison "with the previous incidents in the same and different groups coded in the same category" (Rasmussen et al., 2015, p.25), resulting in some collapsing of different phrasing for similar entities and experiences into a single data-event (e.g., "it was all so hard to handle with using water bottles," "they find it difficult to deal with the daily changes," "the normal things were stressful and hard," "the biggest challenge was that stuff like brushing and bathing became almost impossible,"[16] etc. were all consolidated into the unique data event "Experiences or observes hardship in day-to-day living due to the Flint water Crisis").

During this process, Rasmussen et al. (2015) warn that often, the "analyst will find conflicts in the emphases of his thinking" (p.26). Indeed, the researcher encountered this issue, and thus created memos documenting the logical processes that coding decisions were being based on. In the practice of Grounded Theory, "memos are 'the narrated records of a theorist's analytical

[16] Please note that these statements are close paraphrasing of the actual statements of participants, which are never quoted verbatim in this study due to ethical mandates regarding participant privacy concerns.

conversations with him/herself about the research data" (Rasmussen et al., 2015, p.26), and serve to center the researcher into a critical engagement with the data.

A week after compiling and pruning them, the unique data events were in-turn scoured and comparatively analyzed with accompanying memoing to identify various salient themes. The salient themes were extracted by considering the categories and "relationships between indicators in the data" (Rasmussen et al., 2015, p.25). For example, there is a relationship between "having a need for more resources" and "feeling overwhelmed," leading to a consideration of each as a salient theme; wherein "needing resources" presents as a distinct category. Additionally, Rasmussen et al. (2015) guide that such initial analysis, also known as open-coding, must refer to "as many categories of analysis as possible" (p.25), with the loose guidance of sensitizing topics. Thus, each event was assigned as many overlapping open codes as emerged when considering the data.

Next, a process of comparatively analyzing the overlapping salient themes to see "the relation of these indicators to larger categories, and then to the properties of these larger categories" (Rasmussen et al., 2015, p.25) was commenced in order to ultimately identify central themes and thematic categories within the data. These constitute axial themes, or "codes that researchers apply to all of the data. They should be sufficiently broad enough to capture a range of indicators but specific enough not to cover overly large sections, or "chunks," of text." (Rasmussen et al., 2015, p.25). Usually, finalized axial coding is only attempted with a sufficiently large and diverse sample—despite the lack of this in the current study, axial codes were finalized anyway in order to demonstrate the utility of Grounded Theory methodology in preparing to design bioecological research. However, these codes are strictly to be considered preliminary in relation to the larger, ongoing study and the data emerging from it.

Memoing at this step of axial coding involved documenting definitions of identified thematic categories and the scope of central themes, as well the process of elimination and

consolidation used in creating them from salient themes. Notably, the memos describe the process of handling the overlapping codes appropriately. If a data event was related to more than more one central theme it would be assigned the central theme that it fit best, but its association to the other related central themes could still be seen in the open codes it was assigned (e.g., a data event regarding demographic differences relating to accessibility of mental health services would be assigned the central theme *Mental Health* and the other central themes the data event is associated with, such as S*tratification* and *Accessibility*, would still be seen in the corresponding open codes for the data event). For data events with open-codes that did not provide information about overlap or any additional unique details about the data event beyond what was presented in its thematic categorization and corresponding central theme, the open-codes were removed.

Due to this overlapping organization, it was determined best to consider the data simultaneously at four different levels— Thematic Categories, Central Themes, and Open Codes across two levels. Although this may seem excessively complex, it is important to remember that with a larger dataset the thematic categories and central themes are likely to expand and consolidate more completely and meaningfully the open codes identified, reducing some overlap and complexity.

Ultimately, five thematic categories and fourteen central themes were identified. The Thematic Categories served to describe broadly the topic of each data-event as a category (e.g challenges faced) while the Central Themes provide more detailed (e.g., issue of trust and and accountability) information about the various issues (e.g., accessibility), entities/industries (e.g., non-profits) and experiences/processes (e.g., resilience). The open-codes left in the data discern particular subjects, phrases and words in the data events that are unique and not explained by the categorical or central theme associated, and also show how data events overlap in their central themes as described previously.

Most of the thematic categories were found after coding to correspond to the interview question themes, as seen below, save for one outlying category* assigned to a data event which discussed the expansion in professional opportunity for psychologists, counselors and psychiatrists due to the Flint Water Crisis:

Challenges Faced

1) What can you tell me about how the Flint Water Crisis has affected you and your children?
2) What do you feel are the greatest challenges you face at this time regarding your children?

Resources (needed and useful)

3) Are there any resources in particular that you feel like they need the most?
4) Are there any programs or community resources that you can think of which really help your children?

Positive Outcomes

5) Do you think there has been any positive aspect of the conversation surrounding the Flint Water Crisis?

Professional Opportunity *

The presence of such outliers serves to remind that the dataset is emergent, and that it only represents seven participants. In a complete study with more participants, as open coding would reveal more patterns and topics in data events, it is likely that the number of thematic categories would increase/decrease based on consolidation and elimination that is driven by consensus-patterns and frequency emerging in the data. In turn, it is also important to recall at this time that due to the small sample and the necessarily emergent nature of Grounded Theory work, none of the findings presented through this analysis can generate theory and nor are they indicative of actual population trends. However, as discussed previously, it remains that using this format of analysis as though the study was complete provides insight into how it may be useful in the future, and into gaining the most grounded and intersectional meaning from the information communicated by the current sample.

Despite the focus of the interview questions on children's issues, it became obvious during the iterative coding process that the data discussed adult and broader community issues just as much as, if not more than, children's issues; evidencing the revelatory nature of Grounded Theory methods. To gain more insight on this phenomenon, data events were also coded for

whether they presented issues applicable only to children or issues that applied mainly to adults/ entire communities.

In the ultimate work of using the data to better understand the participants and reveal the pivotal, but less obvious, intersectional relationships and processes operating in the community with a view to enable the correct designing of bioecological research, these axial and open codes were considered with reference to their applicability to children vs. adults/the broader community and in terms of their incidence across all the data events in the sample, as well as within the distinct groups of parents and community experts. Particular attention is paid to the proportionality of the overlap between the thematic categories and central themes in understanding how various processes operate within and impact the community and children of Flint.

Finally, it is important to discuss some of the limitations in incorporating Grounded Theory in the context of this study in particular. For one, because the site of research was not a traditional academic one, the recency of the water crisis and the geographic distance between the researcher and the community, setting up formal collaborations with other researchers was not possible. This is an important component of the Grounded Theory emphasis on reflexivity and bias-avoidance, since collaborative research provides many more chances for critical analysis of bias in data handling since different researchers will bring different perspectives to the data while coding and comparatively organizing it.

Secondly, since the widespread coverage of the Flint Water Crisis was a key factor in elevating it to its current status of international relevance (see Banks, 2002 and Heinderyckx & Vos, 2016 for a discussion of the impact of media coverage in situation like the Flint Water Crisis) and because the very possibility of this study arose only due to the researchers' heavy vocational involvement with the crisis, the Grounded Theory practice of staying away from topical information in order to ignore a priori knowledge was untenable.

In fact, an opposite approach, of gaining a much broader base of understanding than immediately accessible information, proved useful in preventing a heavily researcher-biased design by highlighting previously invisible aspects of the conversation surrounding the crisis. This process of broad research was conducted as a part of mapping community capacities, which has been previously discussed and will be revisited later on.

In an effort to practice reflexivity as a single researcher, written reflections on researcher biases relating to researcher career and disciplinary interests, as well as differing cultural perspectives were conducted, and it was through these that improvements to the original vision of the study were envisioned. Additionally, a written reflection on past and ongoing non-research related contact with the community was conducted after these biases were identified. This reflection was useful in the process of achieving minimal bias in generating the sensitizing concepts.

PARTICIPANTS AND FINDINGS

4.1 Focus on Initial Participants

Although this pilot study was designed with a view to continuing data collection for a longer period, due to the aforementioned challenges regarding timing and academic deadlines, a sub-study focusing on the initial seven participants and reflections on prior communications with various members of the community was commenced while continuing recruitment and data collection alongside. Although this sub-study was unplanned, it was in fact an extremely fruitful undertaking that resulted in a relevant refocusing of the broader pilot study and planned continuing research to be relevantly refocused as has been discussed in the previous section.

In considering the data presented from this small sub-sample, it is important remember that the focus is not on considering particular factors for developmental outcomes or on any kind of

generalizable deductions based on characteristics of the sample and data, but instead on understanding *how* the research process presented here allows the researcher to:

(1) develop warm and open collaborative relationships with the community, in service of ultimately encouraging more equitable, communicative and open relationships between academia and ensuring the generation of ecologically valid bioecological research

(2) generate an intersectional understanding of the community, revealing the less obvious reciprocal dyadic associations and second-order effects within them and thereby allowing for less visible, but pivotal processes to be identified, and

(3) identify key community actors, issues and capacities.

4.2 Participants

The entire sample consisted of seven participants, including two male participants. All but one participant was either from or still living in Flint, MI. All four of the parent participants were women between the ages of 24 and 48 years and all of them had children between the ages of 2 and 9 years of age. Half the parent participants are married, one is engaged and another is single. Three of the four parent participants identify as Caucasian and one identifies as African-American. Half the parent participants have two children each, and half have only one child.

Two of the three 'expert' participants were male and one of the three was female. One of the expert participants identified as African-American and the remaining expert participants identified as Caucasian. The industries represented in the expert participant sample were the health care and legal industries.

4.3 Collaboration and Relationship Building

It is important to consider that the pre-existing relationship of the participants with the researcher, in her capacity as a paralegal explicitly working for them by assisting in the litigation of their lawsuits which demand justice for the suffering they faced due to the crisis, predisposes the parent participants to readily share their experiences with the researcher and deem her as

trustworthy. However, it is noteworthy that normal contact with the law firm through the researcher and other firm employees tends to be formal, reserved and utilitarian rather than warm and open.

On the other hand, warm and open relationships are extremely important in effective community based work since they create an atmosphere of true collaboration and address some of the inequities relating to power and influence emerging from the traditional research paradigm, such as white-coat-syndrome, that can result in community perspectives being underrepresented in the process of research, especially in minority populations. (See Soto et al., 2012, for more information).

In evaluating the efficacy of the research model in enabling warm and open collaboration with the community members, the researcher reflected upon and considered the feedback given by participants about their experiences of the interviews, factors such as follow-up contact and the researcher's own assessment of comfort in the relationship. Only the six participants who were current or past Flint residents were considered in these reflections.

Participant feedback on the interviews showed that all the participants felt comfortable with the process of the interview. In describing their experience of the interview, participants used the phrases "extremely comfortable," "loved," "absolutely fine," "helped," "enjoyed" and "happy." Two of the six participants expressed gratefulness repeatedly regarding the time of the researcher in studying their issues, two expressed interest in reading the completed work, and three proactively offered help through contacts and resources. One participant expressed that they liked the questions because they made them think about the crisis differently.

In terms of ongoing and follow up contact, three of the six participants remain in ongoing virtual contact (initiated by them) with the researcher over social networking, email and text.

Of the six participants, the researcher rated relationship-comfort level as "high" for five participants and "medium" for one participant on a 3 point impressionistic scale of low-medium-

high. In the reflections on comfort level, the researcher mentioned considerations such as participant forthcomingness, participant offers of help and other broad feelings, such as feeling as though "the participant really connected with me and was talkative and warm," "the participant and I were getting to know each other," and in the case of the relationship rated in comfort as medium, the presence of a "sense of distance" despite an otherwise forthcoming and thorough conversation.

In evaluating the circumstances that enabled a rapport to be built with the participants, reading over the reflections revealed that researcher anxiety, participant enthusiasm, personality characteristics, the presence of a back and forth communication about scheduling and rescheduling due to cancellations prior to the interview and promptness in responding to participants may play roles in building a rapport with participants.

Notably, the process of rescheduling built more rapport than it diminished. Saura and Balsas (2014) discuss that "the strategy of postponing is a resource for interviewees to manage their own time and availability" (p.2623), and advise that "telephone interviewing increases researcher control of their social space, because it is easier to reach and locate potential interviewees, it also enabled a far greater degree of control for the participants than a face-to-face interview may have" (p.2627).

Along with the increase in opportunity for communication, and a sense of gratitude regarding the work of accommodating schedule changes, this effect of increased control over space and time management may be responsible for this outcome. Furthermore, participant forthcomingness may have been increased by the sense of empowerment related to control, which is beneficial when considering the element of openness that is being sought out in order to ensure a collaborative relationship with participants.

Finally, specific feedback from two of the three participants in ongoing contact with the researcher revealed that they appreciated the opportunity to put a voice to the name and having

an opportunity to spend some time talking, suggesting some benefits of this telephonic, conversational method of interviewing in achieving a warm and collaborative relationship with participants over written survey administration and instant-relay-messaging interviewing in a context where face-to-face interviews are not possible.

4.4 Mapping Community Capacities

In the process of Mapping Community Capacities through the literature review, over 96 different news and academic articles about Flint and the water crisis were read, along with watching several documentaries, interviews and panel discussions about it. As a result of the review, 37 different community actors were identified for recruitment as participants in the study. These included Flint's city-council members, local and non-local activists and community organizers, artists, students, academics and professionals who have interacted with and/or continue to interact with the community of Flint surrounding issues relating to the water crisis[17]. This outcome of the process of mapping community capacities demonstrates its utility in informing the purposive sampling process for background research.

Apart from this process of identifying individuals, through the community capacities mapping process, programs and resources in Flint were also identified. For example, an ongoing focus surrounding revitalizing the "University Avenue Corridor," the neighborhood in which University of Michigan: Flint is situated (in downtown Flint), was identified, and it was seen that university affiliates were developing methodologies to identify various variables contributing to the amount of crime in a neighborhood[18] Both the city's major hospitals are also in the same ward as this corridor.

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[17] N.b.: more community actors were identified for recruitment to participate through the actual interview process as well; here, only the number identified strictly through this process is provided.

[18] See: https://www.umflint.edu/research/university-avenue-corridor-neighborhood-revitalization-initiative#

Furthermore, there were other neighborhood revitalization programs, mainly in Northern Flint that were identified, which appear to have been established in 2012 as part of the Obama administration's federal neighborhood revitalization initiative. Funding for these ended in late 2016[19]. As part of this process, affiliates of the University of Michigan: Flint developed various maps outlining safe routes and emphasizing the radius of influence around key community buildings such as schools, churches and so on. Revitalization initiatives are also supported by the Ruth-Mott Foundation, which provides citizens with grants for various initiatives and appears to be taking a community based approach in their work by hosting community forums and targeting development goals to what the community prioritizes[20].

Additionally, during the process of mapping community capacities various hierarchies within the relationships of community entities were revealed. For instance, the populations considered vulnerable by the Genesee County Health Department were identified as children under six, pregnant and nursing women, and those living in low-income housing areas (Ayala, 2016). However, it was also identified through the process of community mapping that amidst the lateness of an official announcement in Spanish and the insecurities of undocumented immigrants in Flint regarding their representation and access to resources for recovery, Flint's Hispanic population had to organize through the group 'Latinos United for Flint,' because they were not appropriately recognized as vulnerable by officials (Stillman, 2017).

A full presentation of findings and a visual community capacities map have not been finalized at this stage, since it is important for map to be further guided by the data collected from community participants, which is still an ongoing process. However, from these examples, it becomes apparent how a process of mapping community capacities is useful in the eventual design of bioecological research— it allows the researcher to appreciate the different contexts in

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[19] http://www.northflintcorp.com/wp-content/uploads/2016/03/Flint-BNCP-At-A-Glance_Feb10.pdf

[20] See: http://www.ruthmottfoundation.org/rmf-grantsprograms/

which various voices are heard or ignored, which is beneficial in evaluating the ecological validity of the research (e.g., it would indicate here that the researcher must consider the experiences of undocumented and Hispanic participants separately than other sub-populations since they are likely to have a different experience as seen above).

Moreover, it also evaluates specific power dynamics within different relationships of similar kinds— whereas the Mott foundation may allow community participant/representation in their work, there is no clear evidence of similar practices in other organizations, warning the researcher not to assume that processes seen in dyads involving the Ruth-Mott Foundation are representative of processes involving other similar community organizations in Flint.

Another benefit of the community capacity mapping process to bioecological research design is its capability to identify geo-political hubs of activity. The university, which can be seen through the mapping process as a center of activity through its proximity to the major hospitals and involvement in revitalizing its immediate downtown Flint context of the 'University Corridor,' becomes significant as a potential site of many key dyads within which pivotal processes are located, promoting further investigation into the area when designing bioecological research. Indeed, upon further probing, information such as that presented in Abernathy et al. (2016) regarding university student efforts in supporting crisis intervention, such as digitizing information from 45,000 3"5" index cards and hand-annotated maps that could assist in establishing house-to-house lead contamination risk assessment was discovered.

Finally, the process of community capacity mapping involves broad research that can help identify useful perspectives about specific concerns in the community from different viewpoints. For example, through this method, the following policy recommendations for redressing the crisis were identified: pushing for policy that focuses on expanding access to early childhood and special education services, increasing access to mental health treatment and trauma-informed care for affected youth, encouraging school discipline policy reform, and instituting developmentally

appropriate juvenile justice policies (Healy and Bernstein, 2016). This is helpful in educating the researcher about purposively sampling their research meaningfully, as well as in giving her the ability to discuss issues with various stakeholders effectively in case they come during interviews.

When considered together, these examples also demonstrate that the process of community mapping can be useful in generating meaningful sensitizing topics for grounded research in situations where ignoring a priori information is not possible, such as this one. Moreover, this process pushes researchers to coordinate their work with other community actors effectively which reduces the burden of re-narration placed upon participants, an important consideration when dealing with crisis-affected populations[21]. Because it is an inherently thorough process (see McKnight & Kretzmann, 1997, for more procedural guidance), it allows for less visible dynamics to be revealed than traditional, theoretically-driven, literature review process do.

4.5 Summary of Findings

It is important to reiterate before proceeding that in the current sub-study focus, because emergent sampling is still ongoing, there can be no theory generation from the data. Furthermore, because the sub-study sample is small and not reasonably diverse, deciding final thematic codes is also inadvisable.

However, these processes have been carried out regardless because such an analysis can provide important clues about *how* grounded work reveals the interdependencies between the process, person, context and time components of the bioecological model by disclosing the various less obvious relationships within bioecologies, an undertaking that, as discussed previously, has been revealed by Bronfenbrenner to be essential in building bioecological research.

Additionally, the handling of the data through Grounded Theory processes can reveal *how* this methodology is beneficial in demonstrating person-upon-context effects, which is also an

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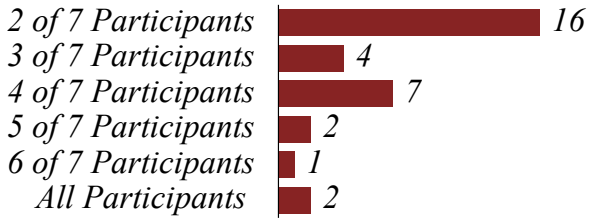
[21] see https://interagencystandingcommittee.org/system/files/legacy_files/TOOLS%20to%20assist%20in%20implementing%20the%20IASC%20AAP%20Commitments.pdf for more information

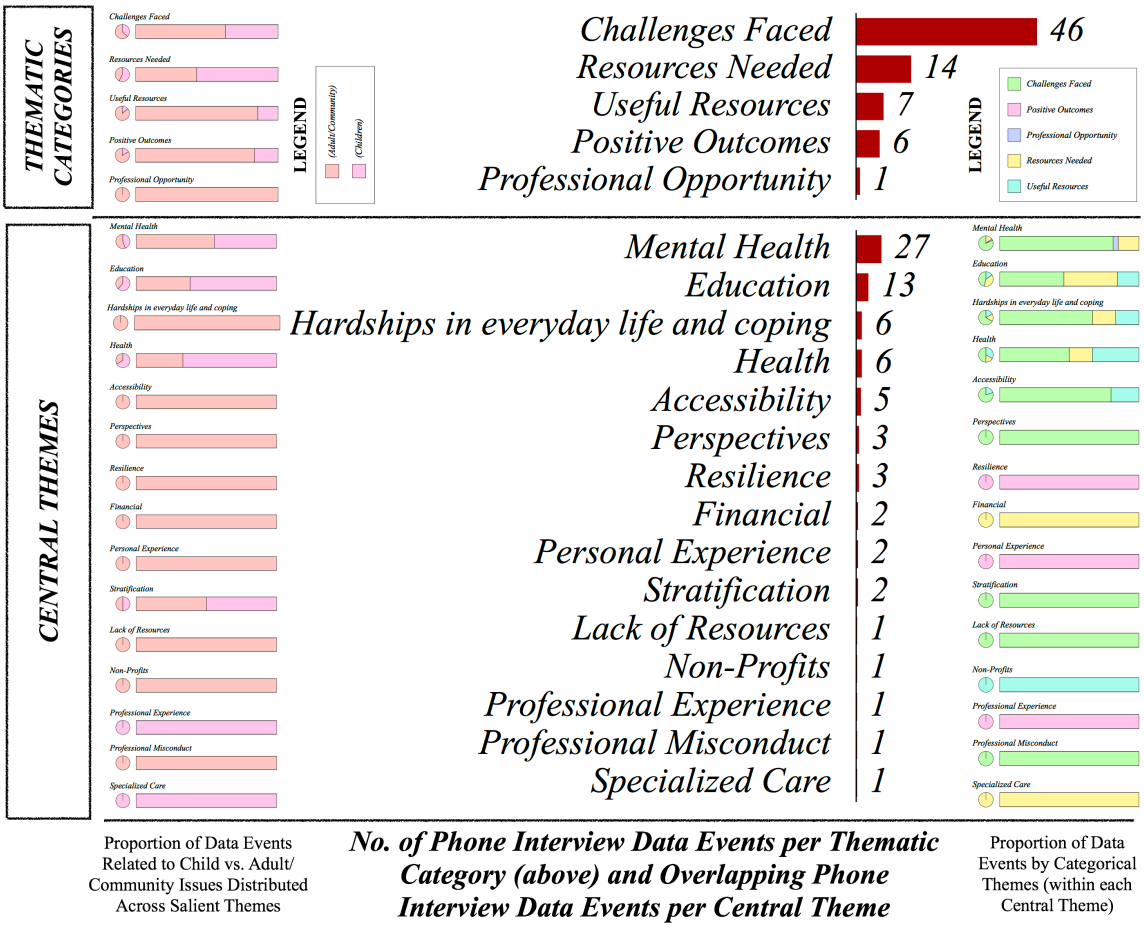
important, but challenging, aspect of generating valid bioecological research as per Tudge et al. (2009). *But it cannot be restated enough that none of these findings can be considered indicative of actual Flint population trends or substantive of formal theoretical concepts relating to the Flint Water Crisis, and that readers should be very carful to avoid misunderstanding exemplary discussions of the results as such.*

After each of the interviews was broken down into distinct data events, the data events from each interview were compiled and grouped to identify 74 unique data events across the sample, out of which only 32 events were common to more than one participant. Half of these 32 events were common to only 2 of the participants, and the others were shared as illustrated below, demonstrating that despite the short length of the interview, the small sample size and the apparent lack of demographic variety, there was a lot of variety in the experiences presented (see below).

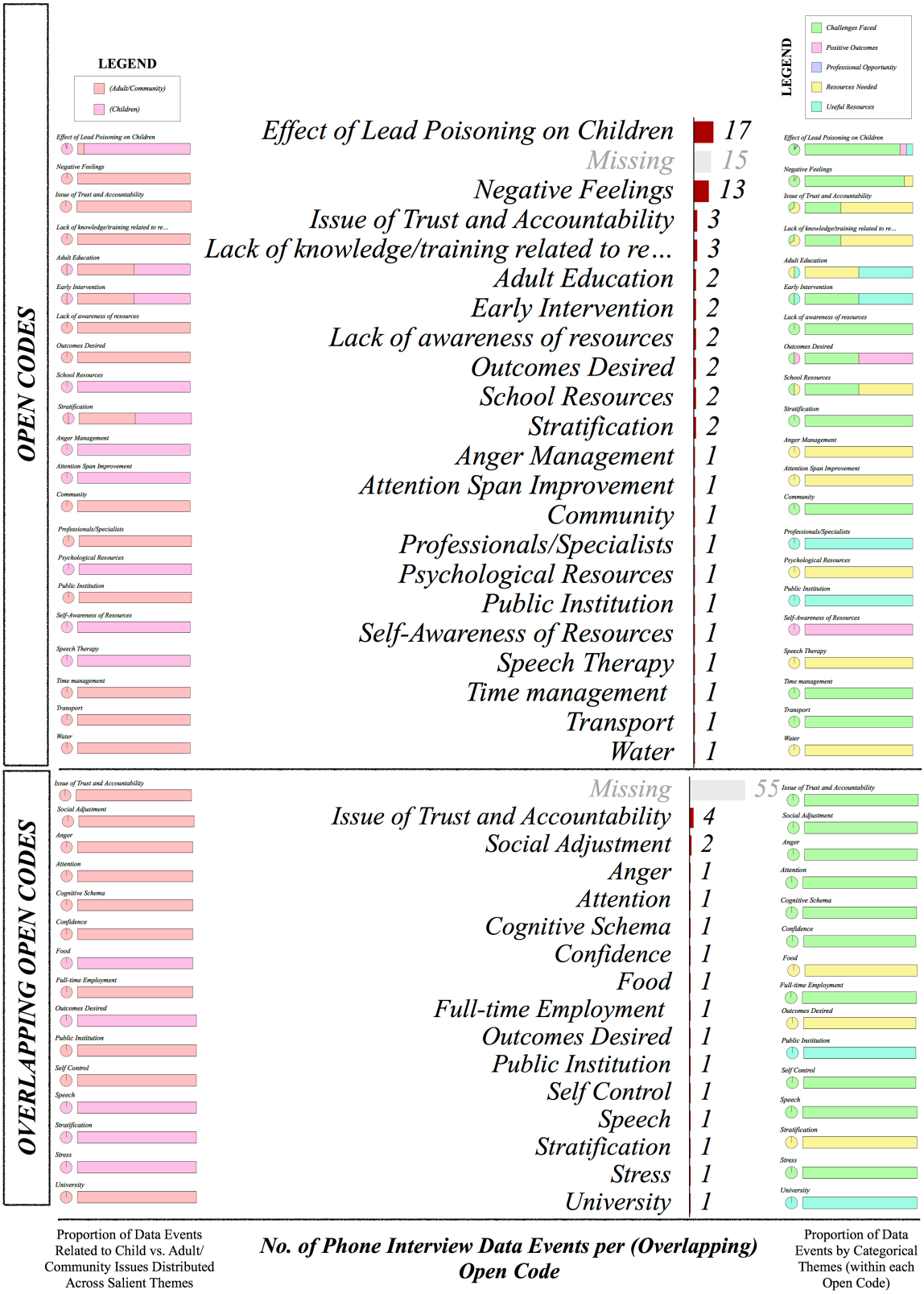


Distribution of 32 Data Events Common to More than One Participant

As a result of the constant comparative method coding process described previously, 5 thematic categories and 14 central themes (axial codes) were applied across data events, with every single one of the 74 unique events being assigned one thematic category and one central theme. The categories and themes were decided by carefully organizing data events with reference to the open codes applied, with care taken to memo the process carefully, as previously described. The number of data events categorized together and given the same central theme was recorded, as was the proportion of data-events about children's issues vs. adult/community issues in each thematic category and each central theme. The proportion of data events thematically categorized together under each central theme was also calculated (see below).



Although many of the open-coded salient themes identified for data events were removed because they were adequately described by the thematic categories and central themes, 36 contingent open codes which presented overlap or unique information outside of the central theme and thematic category of the event were retained in the data. In other words, the data was organized along four levels, with each data event corresponding to one thematic category and central theme each as seen above, while some data events also corresponded to one or two (overlapping) open codes in addition to these. Fifty-nine out of 74 data events had at least one open code (leaving 15 'missing' data events adequately described by the central theme and thematic category assigned, without any open code assigned to them) and only 19 data events had two overlapping open codes (leaving 55 'missing' data events without a second overlapping open code assigned to them) in addition to a central theme and a thematic category assigned to them (see below).



As explained, all data events fit into both a thematic category and also a central theme. The distribution of data events across the thematic categories revealed that participants focused on the questions being asked for the most part, with only one outlying data event (regarding *Professional*

Opportunity expansion). 19 data events generated two overlapping open codes, and only 15 data events had open codes removed altogether since they were adequately described by the thematic category and central theme assigned to them. Considering this distribution along with the relatively large number of central themes (14) and retained open codes (36) provides an indication of the great variety of topics and overlap presented in the data events.

4.5(a) Miscellaneous Data Events

A small number of data events (four) had outlying but notable central themes. One event referred to the general challenge posed by the perceived lack of resources available to deal with the outcomes of the FWC (this event appeared in 57.14% of the sample); another identified a *Non Profit* (open codes), the Community Foundation of Greater Flint, as a useful resource for adults/ communities; another cited a need for *Specialized Care* (open codes) resources for children, and the last discussed *Professional Misconduct* (open codes) as a significant challenge faced due to the crisis.

These outlying events serve to remind that this dataset is still emergent and that there are a lot of unanswered questions and misplaced connections within the analysis of the data from this small, insufficiently diverse sample. As we can see, with more data, these outlying themes may become more emphasized than they are here through the constant, comparative method, generating a different kind of discussion, and ultimately, different theoretical conclusions. However, as discussed previously, exploring this subset of data can still prove useful in terms of demonstrating the utility of a community based approach in most effectively designing bioecological research.

4.5(b) Perceived Burden related to the Flint Water Crisis for Children and Adults

There were over twice as many data events about *Challenges Faced* than there were about *Resources Needed* or *Useful Resources* put together, despite there being the same number of questions in the interview regarding *Challenges* and *Resources.* More of the data events thematically categorized as *Challenges Faced* referred to challenges faced by adults than those faced by children.

Similarly, most data events identifying *Useful Resources* referred to resources for adults. Fittingly, thus, more *Resources Needed* were identified in the sample for children than for adults.

The first finding might indicate that the magnitude of burden perceived regarding the water crisis within the sample is greater than that of a sense of empowerment and preparedness. The very low number of data events indicating a focus on *Positive Outcomes* is consistent with this, and might indicate that higher resilience and positive thinking regarding the crisis might lead to a beneficial reduction in the perception of burden related to the water crisis. Meanwhile, the second finding draws attention generally to adult and child resource availability, encouraging researchers to look further into this topic, and might indicate that although adults are more challenged by the water crisis according to the sample, they are also being provided with a number of useful resources, while children still need resources for the lesser number of (possibly more severe/less readily approachable) challenges they face related to crisis.

While the trend regarding the crisis being perceived as a burden, or of adults finding it extremely challenging to them seen in the sample cannot be considered applicable to the entire population of Flint, the possibility of identifying information like this through such data analysis demonstrates the utility of the Grounded Theory methodology in the process of accessing less obvious patterns relating to the experiences of the participants. Considering the overlap between the the themes in the various levels provides an opportunity for understanding intersectional aspects of the events presented in the data that are not self-evident from a consideration of the data merely through a lens of general impressions or through the sensitizing concepts.

Additionally, it is arguable that simply reading the interviews as individual blocks of data would not have revealed such a pattern across the interviews, since each participant discusses specific issues relating to their particular children/the children they work with (e.g., speech impediments, trust issues, dysfunctional socialization, etc.) which dominate focus and distract from categorical details which can demonstrate patterns amongst the sample, leading to an

identification of the prevalence of significant participant processes such as that of perceiving burden, as presented above.

Moreover, if the interviews were coded for patterns through a rigid pre-existing theoretical lens, e.g., looking specifically for parents' opinions about developmental changes in their children because the researcher is interested in how these opinions affect their children's coping, important information about closely related issues and processes would not become evident: e.g., we would be able to see that parents were concerned about various developmental changes in children, but we would not consider their lack of resilient, positive thinking despite the crisis as a relevant factor in the creation (and thus, the subsequent remediation) of this sense of burden, giving us a less complete understanding of the various processes that are contributing to this issue.

Furthermore, the identification of various challenges ultimately related to the children's well-being as *adult-specific* ones would also be impossible in this situation, since the researchers would only be looking at parental opinions and not at trends or processes operating within the adult community of Flint. However, discovering (and subsequently exploring) adult-specific challenges may demonstrate pivotal second-order effects related to children's coping that would greatly affect any practical recommendations made by the research: e.g., it could be discovered through such an analysis that both the presence of hospital with a free lead-poisoning-effects education program in the child's zip-code and the presence of a vocal pastor who disseminates information about such resources in the child's church may be necessary to change the opinions of the child's parents regarding the developmental changes children are experiencing to the child's benefit, because simply establishing programs without a trustworthy community informant's endorsement may not be sufficiently motivating parents to actually attend them.

As an expansion of the sample (and therefore, of the data) is added to the consideration, these chasms between the topicality of individual interviews and the broader community consciousness will become more and more pronounced, and more and more important processes,

relationships and patterns will be missed if interviews are only considered in blocks or through pre-existing theoretical considerations, making such research less and less relevant to the community by creating situations in which study variables are arbitrarily identified and incorrectly "draped" onto bioecological model concepts, and therefore more likely to result in invalid bioecological research.

4.5(c) Health and Mental Health

Only six data events are assigned the central theme *Health,* while 27 events are assigned the central theme *Mental Health.* Of these 27 events, 81.5% are about challenges faced regarding the crisis, 14.8% are about resources needed, and the remaining 3.7% of the events are about professional opportunities. Notably, despite the high prevalence of the theme, useful resources for mental health were not brought up by this sample. On the other hand, while 50% of *Health* data events referred to health challenges faced, 16.7% referred to resources needed, and 33.3% referred to useful resources.

Breaking down the distribution of the 27 *Mental Health* data events, we see that only 1 event, the same outlier data event discussed previously that is thematically categorized under *Professional Opportunities,* is uncoded on both levels of open coding. Another of the 27, discussing an overwhelmingly mental/psychological experience of the Flint Water Crisis (rather than physical) is assigned the central theme *mental health* and thematically categorized as a *challenge faced* and is open coded with s*tratification* due to the association with the idea that the invisibility of mental health challenges makes them less significant, support for which appears also in the absence of useful resources related to mental health in the data sample as described above.

While only 8 of the 27 events discussed children's mental health challenges as a result of the *Effect[s] of Lead Poisoning on Children* (open codes), all 4 data events about *Mental Health-Resources Needed* (central theme-thematic category) out of the 27 were indicated for children's issues, with the corresponding open codes *speech therapy*, *anger managemen*t, *attention span improvement* and

psychological resources. The remaining 13 events out the 27 are about *Mental Health* (central theme) *Challenges Faced* (thematic category) by adults or the general community arising from experiences of *Negative Feelings*[22] (open codes). 4 of those 13 data events overlappingly correspond to the theme *Issue of Trust and Accountability* (overlapping open codes), because they involve distrust towards others in relation to accountability for the Flint Water Crisis.

Altogether, we can surmise from the above that perhaps physical health considerations are being given more attention than mental health considerations in Flint post-crisis; and particularly, that while the sample might have some understanding of the need for mental health resources for the children, there is little awareness of the need for such resources for adults, although they are facing an incommensurate amount of mental health challenges from the crisis in comparison to the children.

In general, prioritizing physical health over mental health issues in emergency responses is not an uncommon occurrence (see, for example, Kitchener and Jorm, 2002). However, in Flint, these findings suggest that, because there is an obvious connection to mental illness within the existing medical literature on lead poisoning in children (which demonstrates that children are severely affected neurologically by lead), adult mental health issues may be being overlooked even more disproportionally than mental health issues generally are, because the automatic emphasis on children's mental health in the crisis might make professionals and community members believe that they could not possibly be missing any mental health implications surrounding the issue. On the other hand, such attention to the neuropsychology of children during the crisis is surely transforming cultural perceptions of the need for mental health support in the sample as we can see, with a great number of data events in the sample focusing on the need to expand various mental health services including counseling, play therapy and so on for children.

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[22] Data events coded with *Negative Feelings* referred to experiences of the following feelings: *"stress," "anxiety," "shock," "disbelief," "doubt," "uncertainty," "sadness," "pervasive distrust," "outrage," "fear," "like nothing is being done,"* feeling *"unnecessarily put at risk/carelessly treated," "overwhelmed," "a sense of a loss of control or helplessness," "feelings of doubt in humanity,"*

This special double-effect of both overlooking and emphasizing mental health issues in Flint reveals an important element of how personal perceptions of mental health issues during a widely publicized event such as the crisis can start to affect macrosystem cultural perceptions in selective ways, and provides guidance on the need to use the moment to also highlight overlooked issues and populations, in this situation, adults and parents in the community being burdened with a lot of negative feelings and needing mental health support to cope as a result of the crisis, as well as dealing with a significant amount of distrust regarding how the water crisis came about.

While this entire analysis cannot be considered generalizable in anyway as previously explained, it is interesting to note that such a deduction of a person-upon-context effect (the personal perceptions of children's susceptibility to mental health challenges related to the crisis as transforming the interactions between greater macrosystem issue of cultural ignorance of mental health issues and the exosystem of media coverage of existing medical lead-poisoning knowledge) was made possible only as a result of this kind of community based, grounded inquiry, and would arguably stand to be overlooked if a theoretically driven inquiry that never broached or hypothesized the issue at all was undertaken. Missing such person-upon-context effects and only focusing on obvious context-upon-person effects, as we have seen, is a common issue amongst studies misusing the bioecological theory according to Tudge et al. (2009 & 2016), and is, thus, extremely important to pay attention to.

Returning to the data regarding *Health*, we see that the four *Health* data events about challenges faced and resources needed referred only to children's health, related to the open codes *Effects of Lead Poisoning on Children* (3 data events) and *Lack of knowledge/training related to recovery* from lead poisoning, overlapping with the open code *Food* (which is memoed as having to do with dietary considerations in mitigating the effects of lead poisoning in children). Both remaining *Health* data events about useful resources referred only to adult/community resources, one identifying a *Public Institution* (the Department of Health) as a helpful resource provider, and

another, identifying physical health *Professionals/Specialists* as extremely supportive resources during the crisis. Specifically, this refers to instances in the data events where participants indicated that they were strongly supported by, and found extremely helpful the guidance of various professional providers. There was a 50% incidence of this data event amongst the parent participant interviews.

These features of the data suggest that according to the sample, some physical health challenges faced by children as a result of lead poisoning are not currently being addressed, and that physical health related entities such as the Department of Health and medical providers are considered vital resources for adults/the broader community regarding the crisis, especially amongst the parent participants. Again, while this is not indicative of any actual population trends, it becomes evident through the above observations that the Grounded Theory approach allows researchers to pay more critical attention to relationships in the communities studied and to ultimately see the interdependencies between the process, person, context and time components of the bioecological model as Bronfenbrenner has encouraged.

Specifically, here, it becomes clear that supporting children's lead-poisoning related health challenges is being inadequately undertaken, and that at least some of the challenge is related to caregivers lacking knowledge and training regarding these issues. Simultaneously, we see that public institutions like the Department of Health are recognized and trusted as supportive entities in the community, and also that parents find great utility in having a strong relationship with even a single provider. Notably, such a strong relationship can be with any professional provider, and not only primary care providers— in this sample, parents have referred to allergists and speech therapists as crucial support systems — and the effects the relationship go beyond their specialized care, with providers offering emotional (e.g., offering a sense of empowerment and comfort in being accessible should something come up) as well as practical support (e.g., giving specific guidance on resources, including those not directly related to the visit).

When these relationships are critically observed in tandem with one another, and the information regarding the high burden of distrust adults in Flint carry is kept in mind, one can envision that to address some of the gap between children's health challenges and providing them with adequate care, it may be beneficial to consider expanding the relationships between medical providers and parents to include more distribution of targeted lead-poisoning related education through the provider as a central point-of-support, guidance and care with the institutional support of well trusted entities like the Department of Health.

An interesting parallel between this finding and Bronfenbrenner's preexisting work is seen here when one recalls Bronfenbrenner's famous proposition leading to the Big Brothers-Big Sisters program: "every child needs at least one adult who is irrationally crazy about him or her" (Brendtro, 2006, p.163). Considering the relationship between parents and even one single, supportive medical provider in the same way as the single adult willing to participate "in progressively more complex reciprocal activity on a regular basis over an extended period" (Brendtro, 2006, p.163) that every child requires to develop (as per Bronfenbrenner) provides an interesting outlook on the interdependencies between various contexts and relationships that operate in the greater bioecological backgrounds of children's lives.

Perhaps, the distal processes of confidence building and resource awareness for parents through supportive, personalized training as a result of a direct, ongoing relationship with a single medical provider are crucial to the child's post-lead-poisoning developmental outcomes— and since such relationships directly depend on ecosystem gatekeeping entities like bigger public health bodies, it is useful to have knowledge about specifically which bodies of this kind are actually proving helpful and are considered trustworthy in the community, such as, in this situation, the Department of Health, so that their reach and activities may be expanded.

Practically, this might take the shape of encouraging non-profit support in assisting Department of Health initiatives that provide individual providers with more resources to educate

their patients, or for advocates to push further for policies that expand Flint parents' access to individual providers; and in terms of guiding further research, it might take the shape of revealing to researchers of children's health issues related to the crisis that exploring the role and impact of individual medical providers in Flint's healing efforts is an important area of study. While it is possible that such a hypothesis might have been independently considered by a researcher conducting bioecological research, it would remain a matter of chance. Conducting a community based inquiry into the circumstances and capacities of the community prior to designing such research, as is undertaken here, ensures that such relationships and interdependencies are not missed, and can be evaluated in terms of their actual impact in the community before spending precious research resources such as funding and time on them.

4.5(d) Education

There is a high degree of consensus within the sample regarding education issues, with 2 out of 13 data events about the central theme *Education* regarding education appearing in 100% of the phone interviews, and only three of the 13 data events regarding education appearing in less than 30% of the phone interviews.

Of the 13 data events, 5 events are about *Resources Needed* (thematic category) related to education, of which 3 are directed towards adult/community education needs including one data event with no open codes, one about *Adult Education* (open codes) which is also related to the inaccessibility of education to some groups due to *Stratification* issues (overlapping open codes), and another addressing a *Lack of knowledge/training related to recovery* (open codes). The remaining 2 of the 5 *Resources Needed* were indicated for children, related to *School Resources* and *Early Intervention* each (open codes). On average, parent interviews showed 62.50% of data events regarding resources needed for children, while community professional interviews only had an average of 33.33% of data events regarding this.

Conversely, the 2 data events of the 13 data events with the central theme of *Education* which identify *Useful Resources* (thematic category) related to education appeared only in community professional interviews and not in parent interviews at all. One of these is directed towards children, referring to an *Early Intervention* (open code) resource provided through a *University* (overlapping open code), and the other towards adults, referring to *Adult Education* (open codes) resources provided through a *Public Institution* (overlapping open codes).

The remaining 6 events are about educational *Challenges Faced* (thematic category). One of these refers to challenges faced regarding *Lack of knowledge/training related to recovery* (open codes) by adults, and the other 4 are about children's challenges related to *School Resources* and the *Effect[s] of Lead Poisoning on Children* (open codes). There is a greater incidence of the data events regarding children's challenges faced amongst parent interviews (average incidence of 55%) than there is amongst community professional interviews (average incidence of 46.5%). All these data events about challenges faced surrounding education are uncoded on the 4th level.

One of the main issues the data regarding education highlights is that there is a lack of knowledge about useful resources amongst the parents in this sample, who are, arguably, the people needing most to access them. This corroborates the previously discussed need of expanding parental access to medical providers or other institutional informants so that they can actually find out about and benefit from existing resources, thereby indirectly improving their children's healing from the crisis. Furthermore, while this data emphasizes the natural centrality of school in children's educational challenges from the crisis, it also shows that higher education public entities like universities can also play supportive roles in addressing these challenges.

Again, while the above discussion cannot be considered as fully indicative of the situation in Flint, it is beneficial to see that this methodology has allowed for important gaps of communication between different groups within the children's microsystem to be identified, while also identifying the role of unlikely exosystem entities in mediating such gaps. While the

importance of exploring the relationships and interdependencies between various components of the bioecological model has by now already been stated enough, this example provides the opportunity to see how such community based work can reveal less obvious sites where relationships might be forming and pivotal processes might be developing. Finding such sites is extremely important, as they may be key links to bringing together different groups— e.g., universities that are already hosting early intervention programs for children may be an ideal location for parents in Flint to expand their developing relationships with individual medical providers into collective collaborations through existing university relationships with public governing arms like school boards, as well as offer the community an avenue through which to influence how university funds get deployed. Recognizing universities as sites of action within the bioecology of Flint through such community based research is an important step as it opens up the research agenda to inquiring further into such relationships and their corresponding processes within the site.

4.5(e) Accessibility, Stratification and Financial Resources Needed

Data events concerning *Accessibility* (central theme) referred exclusively to adults. Four out of 5 events related to accessibility referred to challenges faced relating to *Time Management, Lack of awareness of resources* and *Transport* (open codes). The remaining 1 data event referred to the useful resource of *Self-Awareness of Resources* (open codes) relating to accessibility.

Meanwhile, the two events concerning *Challenges Faced* (thematic category) regarding *Stratification* (central theme) referred one each to adults/communities and to children relating to the *Effect of Lead Poisoning on Children* (open codes). These events discussed children's and downtown residents' increased hardships and vulnerability to the negative effects of the FWC.

Two data events concerning *Resources Needed* (thematic category) referred to *Financial* (central theme) resources for adults, relating to the broader *Issue of Trust and Accountability* (open codes) in Flint.

To begin with, this data shows how the community based approach is useful in generally fleshing out an understanding of the various potential interactions amongst different relationships within the bioecology of Flint— we can glean from such information that issues such as lack of knowledge regarding available resources can be complicated by a variety of factors like parents' time management skills, access to modes of transport and other resource characteristics, and that individuals' general susceptibility to the FWC might be increased based on demand characteristics such as their age or on where in Flint they live. And moreover, such data provides a framework in which to identify as focal points pivotal process like generating self-awareness (or patient/client-awareness) of resources in navigating the general landscape of accessibility and knowledge of programs, funding and coping mechanisms as well as in mitigating the larger trust issues plaguing the community, emphasizing further the importance of getting to know participants in this way before finalizing bioecological research design.

4.5(f) Hardship, Perspectives, Resilience and Other Experiences

Hardships in everyday life and coping (central theme) were brought up in 5 different data events all referring to adult/community issues. Four of these events were about challenges faced causing hardships due to the *Effects of Lead Poisoning on Children* and a lack of desirable outcomes/*Outcomes Desired* (overlapping open codes) being seen in children ever since the crisis started. One data event referring to *Resources Needed* to cope with hardships discussed the condition of the *Water* (open codes) itself and 1 event referred to *Useful Resources* in coping with hardships (the provision of bottles and filters was cited as appreciated in the data event).

Three data events each referred to:

(1) *Challenges Faced* (thematic category) by adults/communities regarding *Perspectives* (central theme) about Flint and the Water Crisis,

(2) *Positive Outcomes* (thematic category) for adults/communities related to *Personal Experiences* (central theme) and for children related to *Professional Experiences* (central theme), and

(3) *Positive Outcomes* (thematic category) for adults/communities related to *Resilience* (central theme).

The *Positive Outcomes* data events within these 9 events discussed renewals of professional motivation/passion, charitable intent, an expansion of work towards children's issues (none of the parent interviews contained data events regarding these themes, while 44.44% of community professionals' interviews did), appreciation the of visibility of Flint post-crisis (57.14% of all phone interviews contained data events expressing this sentiment), a hope for the FWC to enable breakthroughs in medical knowledge regarding lead poisoning, and so on. Meanwhile, data events discussing *Challenges Faced* about *Perspectives* about the water crisis in the community revealed the existence of communal viewpoints about the water being harmful as well as the crisis being irreversible, a community burden and a failure of society.

Apart from similarly improving the overall understanding of the effects of the crisis upon the community, as the Accessibility data did, these findings also provide more information about how the intersectional identities of various participants impact their experience of the crisis. For example, we can see that community professionals are able to find more points of strength, positivity and resilience (force characteristics) regarding the crisis than parent participants, although most of the community professionals interviewed are also living in Flint and one of them also has a child affected by the crisis. Exploring further what factors of their professional agency are allowing them to have a more resilient and positive attitude regarding the crisis may provide important information as to how to effectively empower parent participants, including providing possible clues on how employed parents amongst the sample might be able to draw more on their professional identities in order to feel more resilient towards the crisis. This can offer important guidance on how to alleviate some of the mental health burden seen in the sample as discussed previously, and generally adds to the list of examples of how community based

research is able to highlight and critically connect the various relationships and interdependencies in the bioecology of Flint.

FURTHER DISCUSSION

5.1 Methodological Implications for Continuing Study Design

Through the preceding discussion of findings, it is clear that engaging in a community based enquiry prior to the design of bioecological research is extremely prudent. It allows for bioecological research to be designed correctly, recognizing the most salient issues in the community and identifying the contextual interdependencies and other relationships within the community where key processes emerge and operate. Concurrently, the community based approach is also crucial in providing an opportunity for communities to be able to leverage the actual procedures of such research more beneficially for themselves, by way or generating the agendas of research and retaining oversight over the process through personal relationships with the researcher(s).

These features are important in ensuring the establishment of ecological validity in subsequent bioecological research. As Bronfenbrenner (1977) has explained, "the properties of the environmental contexts in which an investigation is conducted or from which the experimental subjects come can influence the processes that take place within the research setting and thereby affect the interpretation and generalizability of the findings" (p.29), and so it is important for investigators to ensure that the properties they are assuming the environment to have are actually true of the environment as experienced by the participants. However, Bronfenbrenner (1977) also reminds us that perfect ecological validity cannot be achieved since it is impossible to know exactly every participants experience of the environment. Instead, he urges researchers to consider "like frictionless motion, ecological validity is a goal to be pursued, approached, but never achieved," because "the more closely it is approximated, however, the clearer will be the scientific

understanding of the complex interplay between the developing human organism and the functionally relevant aspects of its physical and social environment" (p.33).

Bronfenbrenner suggests that the easiest way to be able to do this is for the researcher themselves to be a member of the community. However, in many cases, such as this one, that is not possible— instead getting to know participants through a community based methodology can allow researchers to learn more about the participants' experiences, and thus most precisely evaluate the properties of their environment. Even in cases where it is possible, since the researcher cannot account for every experience in the sample, such a method would still arguably be useful; and perhaps even more so considering that researchers who believe they understand a community entirely due to their affiliation with it may invest less time in reflecting on community dynamics and thus be more prone to overlooking certain features of the intersectional experiences of various community sub-groups and individuals that differ from their own experience of belonging within community.

Bringing in participant accounts in this sample, for example, provides many important perspectives on the environment of Flint that can contribute to creating ecologically valid research. For one, we have seen in this sample that there are extant issues of mistrust regarding accountability for the crisis, amidst which the Department of Health has emerged as a more trustworthy agency than some others: this would suggest that if one wanted to create ecologically valid research surrounding, for example, the distal process of parental collaboration with resource providers, one should take care not to study the issue within a sample of only Department of Health providers since this would provide misleading information about parental collaboration in general. Not having conducted such a background effort of getting to know participants before designing the research, thus, could have led to an ill-considered research design with ultimately invalid results.

Furthermore, such community based work is important in revealing the interdependencies between the process, person, context and time components of the bioecological model and in analyzing them as parts of a system. It is also useful in exploring the differing directionality in the various relationships, revealing second order effects, and so on. These are all important components of correctly designing bioecological research. As we have seen in this sample, community based work has allowed the researcher to learn that distal processes regarding awareness of resources change across personal characteristics of parents, such as their status as professionals/non-professionals. Furthermore, we can also see through this inquiry that the general idea of whether a resource might be necessary changes along different contexts. For example, within the microsystem, context-upon-person considerations, of what an individual child is experiencing as seen by the family, and in terms of school and social success, play a role in parents' awareness of the need for a particular resource; but simultaneously, through this type of investigation, we also see that person-upon-context effects, such as parents' changing opinions regarding neuropsychology as informed by the media's promotion of medical knowledge regarding lead poisoning (in turn) impact macrosystem cultural trends like the tendency to ignore mental health issues. These are both important to consider when evaluating where processes related to awareness of resources may be located and how they might be operating.

Additionally, community based work such as mapping community capacities allows researchers to gain a deeper understanding of the community's historical background and socio-economic inequities, an important part of correctly considering the time component of bioecological research. Here, through the background research conducted as a part of the process of community capacity mapping, we can see that Flint's history of white flight has created a present of racial inequity and environmental injustice that continues to dictate how the post-crisis response shapes itself. Seeing this, researchers can consider within the time component of bioecological research how historical inequities relating to race in Flint continue to affect parents'

ability to gain awareness of and access to various water crisis resources by informing their attitudes towards their own agency and worth, and by informing the attitudes of contempt and disregard exhibited by government officials and so on towards them. (Davidson, 2016; Hammer, 2016 and Moyo, 2017).

Finally, in assisting with creating warm, collaborative relationships with the community members, such community based methodology also allows, arguably, the longitudinal aspects of most bioecological work to become easier and more successful. Having a warm relationship with participants helps maintain their study involvement over years, as well as ensuring that the participant will provide important feedback and advice freely and openly to whatever degree possible.

5.2 Applicability of Sub-Study Findings

Naturally, given that the current study is still ongoing and the data is emergent, more specific methodological implications for further research (e.g., defining variables and generating hypotheses) cannot yet be derived from the small sub-sample presently considered. However, certain findings presented here can be highlighted as warranting additional inquiry in further research, since they are also corroborated in existing published research about the water crisis as seen during the process of mapping community capacities. Amongst these findings is the issue of adult mental health in Flint. Cuthbertson et al. (2016), who explored mental health and substance use issues through surveying purposively sampled, expert panelists from Flint and surrounding areas, have also found that there are mental health consequences for adults in Flint due to exposure to the water crisis, particularly in terms of negative feelings. The researchers report that "panelist expertise included health services, substance use prevention, health-related non-governmental organizations, disability service organizations, schools, and researchers" (Cuthbertson et al., 2016, p.901).

As they explore the prevalence of stress, other negative feelings and general mental health in Flint, related to the water crisis, Cuthbertson et al. (2016) outline how "stress, especially prolonged or chronic stress, has the potential to lead to severe physical health outcomes… worsens other mental health indicators…and in combination with low socioeconomic status may lead to greater risk of premature death" and how "decreased sense of control has been positively associated with acute stress disorder" (p.905).

They explain that "the built environment can affect mental health directly through factors such as housing quality and indirectly through factors such as a sense of personal control over one's surroundings" (Cuthbertson et al., 2016, p.899), emphasizing that distress can be seen as a "natural reaction… a psychosocial response to environmental disasters, based on direct and perceived individual impact and risk to health" (Cuthbertson et al., 2016, p.900) and reminding that "experiences and interpretations of distress vary by social positionality" (Cuthbertson et al., 2016, p.900). In Flint, they argue, "neighborhood social capital has been directly, negatively related to stress and depressive symptoms" (Cuthbertson et al., 2016, p.900), which is important to consider since social and collaborative momentum appear to be pivotal in various aspects of healing from the crisis (see Miller and Wesley, 2016).

Cuthbertson et al. (2016) also report that the surveys characterized "stress… as feeling nervous, scared, angry, frustrated, and distrustful, with a lack of confidence in the political system or government" (p.902), elaborating that "panelists perceived stress to become much worse as the water crisis unfolded during the course of the surveys; panelists perceived a brief reduction of stress around the time of the switch back to DWSD, but that it rebounded as the long-term effects of lead exposure on individuals, families, and infrastructure became more widely known and as media attention increased" (p.901).

Overall, Cuthbertson et al. (2016) reported that "several mental health issues that were increasing as the water issues in Flint unfolded. Like the physical health consequences of lead

poisoning, the full extent of mental health consequences may not be known for some time. Efforts to provide funding or services for the health consequences of lead and other contaminant exposure would be remiss if they did not include coverage for mental health effects many residents continue to face" (p.906).

Underlying this increase in mental health issues, they explained that there was a perception amongst panelists that the situation was "disastrous" and a "crisis" (p.902), and that panelists found stress to "have a contagion effect " (p.903), creating a variety of abnormal behaviors in the community which are in turn stressing even individuals with no direct contact to the contaminated water. Furthermore, the panelists "identified anxiety and depression as increasing" (Cuthbertson et al., 2016, p.903) as a result of the crisis as related to the uncertainty regarding the severity of damage caused by lead poisoning, which they explain created an immense sense of loss of control that was very hard for residents to cope with.

Alongside this, the widespread media coverage of the situation that emphasized negative reports about the community's economy and crime rates were also lowering residents' morale and ultimately resulting in depression as per panelists, who reported that there has been a distancing from neighboring communities of Flint residents due to associated stigma; that "home property values, already down, are now in crisis mode…restaurants have lost business and have laid off workers, biological parents of foster children are demanding children not be placed in Flint foster homes, summer job programs for low-income county youth are being affected as families are asking for opportunities out of the city" (Cuthbertson et al., 2016, p.904). Given these wide-reaching effects, panelists have "perceived [the water issues to] have spillover or ripple effects into other areas of behavioral health, such as abuse and substance use" (Cuthbertson et al., 2016, p. 903).

The panelists also highlighted their observation that the crisis would have the "greatest impact among African Americans and those of low socioeconomic status in the community.

These two groups were identified as those who were disproportionately receiving contaminated water and those who had the least resources to cope with it" (Cuthbertson et al., 2016, p.903).

Notably, Cuthbertson et al. (2016) reported that in response to these issues "the *health and human services sector* came together quickly to provide both information and interventions that address stress, anxiety, depression, and trauma brought about by the water crisis… Genesee Health System, convened the Flint Community Resilience Group… with the overarching purpose of providing input regarding the needs within the community, assisting with planning, and facilitating service delivery… produced a draft Behavioral Health Recovery and Resilience Plan" (Cuthbertson et al., 2016, p.905-906).

From the above, the linkages between the themes brought up within the small sub-sample interviewed as a part of this study regarding mental health and negative feelings become clear, and the frequency with which these themes arose in the sample becomes contextualized. Additionally, we see that the intersectional identities of residents do play a role in their susceptibility to the harmful effects of the poisoning, as some of the preliminary findings suggest. Furthermore, like the participants in this sub-sample have identified, the Department of Health and related public health bodies in Flint appear to be, on the whole, a useful and proactive resource to the community as it deals with the crisis, although particular actors within the agency were involved in covering-up the extent of the issue. Cuthbertson et al. (2016) provide supporting evidence for considering the intersectionality surrounding the impact of the water crisis on adult mental health issues and the allied position of the Department of Health with Flint's residents as additional sensitizing concepts in the ongoing pilot study is advisable.

In addition to all this, Cuthbertson et al. (2016) also noted that panelists had "indicated a relationship between lack of confidence in government, inability to trust authority figures, and mental health. On the Flint water issues, a panelist stated, "[i]t has added stress to an already vulnerable population and created even more distrust among city and state

leadership" (Cuthbertson et al., 2016, p.904). Furthermore, panelists observed that "a sense of abandonment" (Cuthbertson et al., 2016, p.904) was compounding the impact of trust issues on mental health.

This gives cause to revisit the related issue of the importance of pervasive mistrust in Flint that was brought up in the introduction. This issue was already identified as a sensitizing concept for the pilot study, but is put into better perspective when it is considered as related to mental health in Flint, as Cuthbertson et al.'s (2016) panelists have noted that issues regarding trust contribute to the increase in mental illness in Flint. In the sub-sample considered here, there have also been many references to the lack of trust in the community related to the actions causing the crisis, and the ill effects thereof. Expanding this discussion, Miller and Wesley (2016) explain in more detail how pervasive mistrust creates problems in communities, and provide some guidance on overcoming the issue.

To begin with, they recount that "social scientific literature highlights that communities tend to respond in either a therapeutic or a corrosive manner" (Miller and Wesley, 2017, p.70) to crises. They explain that therapeutic responses are usually found in situations where a natural disaster has occurred, where the crisis is assumed to be an "act of God…with no one to ascribe blame" upon (Miller and Wesley, 2017, p.71). Therapeutic responses are characterized by "mutual helping… previous community conflicts and race, ethnic, and social class barriers appear[ing] temporarily to fade away…communities tend to come together and foster a sense of common mutual aid and comfort to others impacted one way or another" (Miller and Wesley, 2017, p. 70-71).

On the other hand, corrosive responses are found most often to follow man-made, technological disasters, and tend to be "characterized by social disruption, a lack of consensus about environmental degradation, and general uncertainty… a chaotic, nonlinear, and extended trauma rooted in the production of fear of ongoing health consequences" (Miller and Wesley,

2017, p.70). Miller and Wesley (2016) explain that such corrosive responses are built upon destabilizing and pervasive mistrust:

> Perceived loss of control leads the public to lose trust in regulatory agencies, government, and officials because citizens regard such disasters as emanating from the failure of these actors and agencies to do the job entrusted to them… Damage to the bonds of social trust continues when secrecy and non-transparency create long-term uncertainty. Community residents are faced with the essential questions: Who did it? Why did this happen? The ongoing issues and concerns with toxic contamination are often never forgotten and have numerous social and psychological impacts. Places are no longer safe and a constant sense of fear and alertness becomes the new normal. Not knowing and uncertainty regarding the person or persons responsible for the human-induced disaster promote a state of paranoia and uncertainty. A sense of constantly looking over ones shoulder develops among survivors. Lack of trust and a need to affix blame emerge… Furthermore, tensions rise among different communities within a given society. These catastrophes are routinely followed with lasting disputes and litigation concerning allocation of fault for the calamity and the issues revolving around restitution arrangements. Neighbors and friends who once lived in harmony may no longer trust elected officials, leaders, or each other after an exposure event because of the perceptions of benefits, or magnitude of loss in the aftermath of toxic exposure is related to what Bell cites as a form of "community anomie," which causes residents to distrust one another and withdraw from collective life. (Miller and Wesley, 2017, p. 71-72)

Considering the features of the Flint Water Crisis, it becomes clear that it is predisposed to creating a corrosive, rather than therapeutic response. As Dr. Bellinger (2016) has emphatically noted, the citizens of Flint have been abjectly failed by their governments, and mistrust in the face of this is only natural. Based on this, Miller and Wesley (2016) demonstrate that healing in Flint would require addressing some of the features of corrosive responses as presented above, including providing "full acknowledgment of the long-term medical, social, cultural, political,

economic, and civic trust impacts;" practicing "reflexive inclusivity[23];" and recognizing "restorative justice[24] as a part of environmental justice in environmental crime cases" (p.74).

Additionally, Roy (2017) has described how mistrust and misinformation have mutually compounded the effects each other in the Flint Water Crisis, which "not only left infrastructure and government agencies in need of cleaning up; the information landscape was also messy" (p. 22). To begin with, we see that public mistrust in the community grew throughout the crisis:

> As the Flint water crisis unfolded in 2015 and early 2016, the decline in public trust was palpable: People distrusted the city's water, the distributed lead filters, and any messaging from government agencies. As resident Kenneth Glover told the New York Times, "I don't even give [the water] to my dog.... I don't care how many filters they give us. I don't care what they say. How can I trust them again?" (Roy, 2017, p.23)

While, as Roy (2017) notes, this mistrust had some positive effects— e.g., "it is what led residents to collaborate with our team and sample their own tap water in August 2015-the results of which, as one resident told me, were "empowering," [it remains that] trust voids are often a perfect breeding ground… to capitalize on rampant fears" (Roy, 2017, p.23). He goes on from here to crucially demonstrate the distrustful "atmosphere enabled misinformation campaigns that spread harmful falsehoods about the water's quality-for example, that the distributed lead filters do not work or that lead aerosolizes in the shower and can harm one's lungs-to briefly gain momentum" (p.23). Because of the mistrust, residents "turned against scientifically valid advice no matter who offered it" (Roy, 2017, p.23); including the team that had helped expose the

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[23] "Reflexive inclusion combines both constituent affairs with a more active role in the total development of policies. A reflexively inclusive conceptualization of the fiduciary role government officials have involves the development of a critical appreciation of the public sphere's history, ethnic-gender composition, and culture in relation to past and present power relationships that motivate unintended negative consequences that can compromise the integrity of the road to the rebuilding of trust" (Miller and Wesley, 2017, p.74).

[24] "The United Nations puts forth five assumptions for restorative justice (1) the response to the crime should repair as much as possible the harm suffered by the victims, (2) offenders should be brought to understand that their behavior is not acceptable and that it had serious real consequences for the victim and the community, (3) offenders can and should accept responsibility for their actions, (4) victims should have an opportunity to express their needs and to participate in determining the best way for the offender to make reparations, and (5) the community has a responsibility to contribute to this process" (Miller and Wesley, 2017, p.74).

contamination of the water in the first place: "people's distrust in the government was so high that a few in turn mistrusted us because some of our measurements showing the improvement in Flint's water were funded by the EPA, even though we had also self-funded the earlier water testing in Flint that originally exposed the agencies involved in the crisis" (Roy, 2017, p.25).

Although there were some legitimate concerns about the water emerging from the mistrust, such as regarding the efficacy of the water filters which had only been designed to remove much lower thresholds of lead than Flint's water had been shown to contain, even when answers were found through testing the filters which were found to work, the public felt unable to trust the water regardless, and this mistrust was exploited: "as they and concerned citizens in other towns turned to online sources and social media for support and information, some of the content they found was harmful.

For example, several YouTube and Facebook videos misuse a common water measurement total dissolved solids (TDS)-and claim that it shows that water filtered using certified lead filters is still not safe or that even bottled water distributed in Flint has high lead levels," although this method of testing cannot provide accurate information on the content of lead in the water, or even serve as "a standard for water safety in general." (Roy, 2017, p.24) Sadly, such videos, which are blatantly misleading— like one that stated that "water with TDS of 103 parts per million is "horrible," although the World Health Organization states TDS of 300 parts per million is "excellent" (Roy, 2017, p.24) —are being spread rapidly online (Roy, 2017).

While the examples above relate to a relatively innocent, fear-driven misinformation campaign, there were also more concerted, sinister misinformation drives exploiting the situation of mistrust in Flint, such as Mark Ruffalo's Water Defense non-profit which independently tests water quality in various communities: "their opportunistic, irresponsible intervention in Flint, in which commercialization of a new product was cloaked as humanitarian science, preyed on an

already traumatized population's fears and impaired efforts to rebuild public trust in the safety of the city's water for bathing and showering" (Roy, 2017, p.24).

The non-profit's claims regarding disinfectant by-products were exaggerated and damaging, as well as patently unscientific, e.g., "we were dumbfounded when Ruffalo claimed on CNN that DBPs in Flint's water could originate from corroded lead and galvanized iron pipes, which defies the laws of chemistry… but avoiding bathing because of Water Defense's misleading claims has had serious consequences for Flint residents. Indeed, a spike in gastrointestinal diseases, which is often symptomatic of poor sanitation, was witnessed in May 2016 and could be attributed in part to Water Defense's false warnings about the dangers of bathing or showering" (Roy, 2017, p.25). But as Roy (2017) explains, "Water Defense's false explanations for the skin rashes gave many mistrustful and traumatized Flint families an explanation that, no matter how flawed, was satisfying" (Roy, 2017, p.25).

Finally, it is important to note that the mistrust and fear generated remains real long after debunking: "Nonetheless, the fear of the water is still real for residents. Students at Northridge Academy in Flint, for example, told us during an outreach visit in November 2016 that they still avoid taking showers because they are scared. The local media's initial lack of scrutiny of scientific-sounding claims from nonscientists gave the potentially dangerous misinformation some credibility" (Roy, 2017, p.25).

In considering the expanded discussion of the issues as presented above, there is increasing support to the idea that focusing on processes and contexts of rebuilding trust in Flint is a vital endeavor in mitigating the increase in mental health issues amongst adult residents and in generally healing the community. As the pilot study progresses, if support for this idea does not diminish, then it would arguably be prudent to consider this topic as an area of focus for the subsequent bioecological research planned.

5.3 Limitations

Some of the limitations of this study, such as the lack of research collaborators and the various temporal challenges leading up to a small sample and insufficiently diverse sample have already been discussed.

Apart from these, there have also been notable limitations regarding rigor in this study. Brodsky et al. (2015) explain that qualitative research must, as all other research, be rigorous in " its design, enactment, and researcher competence, as well as the paradigms and associated beliefs (e.g.,, multiple "truths", respect for context over data control and manipulation)" (p.17). They emphasize that while "external validity is perhaps the most applicable and central to qualitative methods, a more appropriate way to think about rigor in qualitative methods is to replace quantitative standards of validity, reliability, and generalizability with standards to judge the trustworthiness of qualitative work" (Brodsky et al., 2015, p.17). Such standards "include (a) authenticity, the fairness, sophistication, mutual understanding, and empowerment of participants and consumers of the knowledge to take action; (b) credibility, the accurate representation of multiple realities; (c) transferability, the applicability of the findings to other settings; (d) dependability, the consistency of findings; and (e) confirmability, objectivity in data collection, analysis, and presentation" (Brodsky et al., 2015, p.18).

In following these guidelines, various research protocols such as creating an audit-able trail of research memos, notes and reflections, using a variety of data-types and triangulating findings across them, as well as including research collaborators, key informants and participants in the data analysis are important. However, privacy concerns emerging from the vocational connection of the researcher with the participants and time and scope concerns for the study between academic deadlines created a significant obstruction in realizing such procedures to maintain rigor.

Furthermore, because the study's basic objective of creating a bridge between a highly theoretical model of research—bioecological research— and a highly emergent, variable and

community driven model of research—community based participatory research— does not have much precedent in existing literature, it has proven difficult to effectively anticipate and address limiting factors.

Nevertheless, efforts were made to maintain as much of a reflective trail and participant collaboration as was possible, including asking participants for their opinions and feedback during interviews and using interview data to guide the development of sensitizing concepts, writing reflections on the research process and openly disclosing the various legs of evolution the study underwent as a part of outlining the research process.

CONCLUDING REMARKS

In bringing to a conclusion this reflection upon the methodological benefits of the pilot exploration of the situation post-crisis in Flint, it is helpful to return to one of the first topics of the paper: the issue of *Overturning the Research Paradigm to Advance Science and Defend Public Welfare*, that Mark Edwards and Amy Pruden (2016) so valiantly exposed by defying, despite the lack of a system incentivizing them to, malpractices of the scientific institutions and agencies that could have provided life-saving checks and balances preventing the Flint Water Crisis from ever occurring.

As Lambrinidou (2016)— a colleague of Edwards involved in the on-ground work in Flint and an anthropologist with a proven commitment to increasing conversations regarding professional ethics amongst graduate students —has emphasized, overhauling research traditions in this way is something that "communities across the country are in dire need of" (p.12058). She has also underscored the very premise of this study in her reflections on her work in Flint, stating that:

> Listening to affected publics… is, important from beginning to end… Sustained listening can bring scientists and communities into partnerships of mutual learning, decision-making, and trust. It can also create opportunities for "checks"

> on the effectiveness of scientists' interventions and their ability to remain attentive to the often-evolving experiences, knowledges, and goals of the publics they aim to serve… [it] creates opportunities for " new knowledge relationships" between scientists and the public… [exposing the] limitations in scientific knowledge [which blur] the boundary between "expert" and " lay" spheres… Affected publics routinely serve not only as "data gatherers" but also as holders of information that complicates, challenges, and even corrects entrenched scientific understandings…Listening demands recognition that… injustice involves structural inequalities that scientists cannot reverse alone and nobody can reverse expediently… scientists can help bolster local knowledge with technical training and other relevant information, empowering communities to claim a seat at the table where solutions are forged, and to advocate that the asymmetries that placed them at risk and harmed them be redressed… Listening holds promise for democratizing government, industry, but also science, and ensuring that "bottom-up" research paradigms are truly bottom-up. (Lambrinidou, 2016, p.12058)

Of course, in following the work presented here, by now it must be clear to readers that all the issues presented above are crucial, and research paradigms such as this one— which Lambrinidou (2016) has termed "bottom-up" research —are instrumental in creating democratic and beneficial science. While this is undeniably an invaluable lesson and critical first step, the process of this research has led to the personal conclusion that simply listening is not enough.

Although this is only still emerging as evident throughout the ongoing study, we can start to see that underlying this work is a process that is somewhat more intimate than listening (although it begins there): a process of *getting to know* participants —over a period of time, in ways that surround the research issue at hand *and also in ways that have (ostensibly) little to do with it;* one of putting community voices in critical and mutually challenging conversation with one another rather than focusing on the topical, singular exchanges that theoretical allegiances would have driven us to. It has been a process of listening not just once, but again and again; one of establishing relationships and accountability to individuals, one of thinking both about information that is shared and that which is unspoken.

While the practical outcome of this as the study proceeds is something only history can bear witness to, the theoretical case that taking such a community-based approach in the work of

bioecological research within developmental psychology is very beneficial to producing valid research can be made immediately, as we have seen above.

In reiterating the utility of bioecological research in the future of developmental science, and in reminding us of how challenging it can be; as well as relating it to the same principles of public service and democracy that Lambrinidou (2016) has mentioned, it is useful to consider a pertinent summary of this case that Lerner (2006) has made:

> Contemporary developmental science — predicated on a relational metatheory and focused on the use of developmental systems theories to frame research on dynamic relations between diverse individuals and contexts — constitutes a complex and exciting approach to understanding and promoting positive human development. It offers a means to do good science, informed by philosophically, conceptually, and methodologically useful information from the multiple disciples with knowledge bases pertinent to the integrated, individual <-> context relations that compose human development. Such science is also more difficult to enact than the ill-framed and methodologically flawed research that followed split and reductionist paths during the prior historical era… Such science is also more difficult to explain to the Person in the Street.
>
> Through such research, developmental science has an opportunity to combine the assets of our scholarly and research traditions with the strengths of our people. We can improve on the often-cited idea of Kurt Lewin (1943), that there is nothing as practical as a good theory. We can, through the application of our science to serve our world's citizens, actualize the idea that nothing is of greater value to society than a science that devotes its scholarship to improving the life chances of all people. By understanding and celebrating the strengths of all individuals, and the assets that exist in their families, communities, and cultures to promote these strengths, we can have a developmental science that may, in these challenging times, help us, as a scientific body and as citizens of democratic nations, to finally ensure that there is truly liberty and justice for all. (Lerner, 2006, p.13-14)

Perhaps the theoretical case being made here will inspire more research along the same vein, and the methodological example it has outlined can provide researchers, especially young students who often feel helpless in this regard, with useful information on how to effectively conduct such work and explain and justify it to the proverbial person in the street; reconciling community based work with the exhortation of one of its pioneers that well-considered, community-centric theoretical outlooks can be practical, participatory and liberating.

REFERENCES

1. Abernethy, J., Anderson, C., Dai, C., Farahi, A., Nguyen, L., Rauh, A., ... & Tan, X. (2016). Flint Water Crisis: Data-Driven Risk Assessment Via Residential Water Testing. Preprint. 1610.00580. Retrieved from https://data.bloomberglp.com/company/sites/2/2016/09/paper_47.pdf

2. Athey, S., Ferebee, K. M., & Hesford, W. S. (2016). The poisoning of Flint and the moral economy of human rights. *Prose Studies*, 38(1), 1-11.

3. Atkinson, S. (2016, March 14). Flint River Can Still Be Part of the City's Master Plan. Retrieved March 17, 2016, from https://nextcity.org/features/view/flint-water-crisis-city-rivers-economy

4. Avgar, A., Bronfenbrenner, U., & Henderson Jr, C. R. (1977). Socialization practices of parents, teachers, and peers in Israel: Kibbutz, moshav, and city. *Child Development*, 1219-1227.

5. Ayala, Y. E. (2016). An ethnographic snapshot of vulnerable populations at risk of lead exposure during Flint water crisis. Retrieved from http://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1541&context=gsurc

6. Banks, S. (2002). The Erin Brockovich Effect: How Media Shapes Toxics Policy. *Environs: Envtl. L. & Pol'y J.*, *26*, 219.

7. Barner, D., & Baron, A. S. (Eds.). (2016). *Core Knowledge and Conceptual Change*. Oxford University Press.

8. Bateman, T. S., Sakano, T., & Fujita, M. (1992). Roger, me, and my attitude: Film propaganda and cynicism toward corporate leadership. *Journal of Applied Psychology*, 77(5), 768.

9. Baum, R., Bartram, J., & Hrudey, S. (2016). The Flint Water Crisis Confirms That US Drinking Water Needs Improved Risk Management. *Environmental science & technology,* 50(11), 5436-5437.

10. Beckrich, A. (2016). When Lead Flows From the Tap. *The Science Teacher*, 83(4), 10.

11. Bellinger, D. C. (2016). Lead contamination in Flint—an abject failure to protect public health. *New England Journal of Medicine*, 374(12), 1101-1103.

12. Benson, M. J., & Buehler, C. (2012). Family process and peer deviance influences on adolescent aggression: Longitudinal effects across early and middle adolescence. *Child development*, 83(4), 1213-1228.

13. Bishop, A., Davis, M., & Flatt, P. (2016). Lead Toxicity and Flint, Michigan. *Academic Excellence Showcase Proceedings*. Paper 42. Retrieved from http://digitalcommons.wou.edu/aes/42

14. Bosman J, Davey M, Smith M. As water problems grew, officials belittled complaints from Flint. *New York Times*. January 21, 2016: A1.

15. Boyer, R. (2016, August). The Flint Water Crisis-What Happened and Lessons Learned. In *IAFP 2016 Annual Meeting*. IAFP.

16. Brady, S. R. (2015). The Delphi Method. *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods*, 61-67.

17. Brayman, Lolita. (2016). Why haven't Flint residents fled? *Washington Post Journal*. Retrieved from https://www.washingtonpost.com/news/monkey-cage/wp/2016/02/22/why-havent-flint-residents-fled/

18. Brendtro, L. K. (2006). The vision of Urie Bronfenbrenner: Adults who are crazy about kids. *Reclaiming children and youth*, 15(3), 162.

19. Brodsky, A. E., Buckingham S. L., Scheibler, J. E., & Mannarini, T. (2015). Introduction to qualitative approaches. *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods*, 13-22.

20. Bronfenbrenner, U. (1993). The ecology of cognitive development: Research models and fugitive findings. In R.H. Wozniak & K. Fischer (Eds.), *Development in context: Acting and thinking in specific environments* (pp. 3-44). Hillsdale, NJ: Erlbaum.

21. Bronfenbrenner, U. (1943). A constant frame of reference for sociometric research. *Sociometry*, 6(4), 363-397.

22. Bronfenbrenner, U. (1944). A constant frame of reference for sociometric research: Part II. Experiment and inference. *Sociometry*, 7(1), 40-75.

23. Bronfenbrenner, U. (1945). *The measurement of sociometric status, structure and development*. New York: Beacon House.

24. Bronfenbrenner, U. (1947). Research planning in neuropsychiatry and clinical psychology in the Veterans Administration. *Journal of clinical psychology*, 3(1), 33-38.

25. Bronfenbrenner, U. (1951). Toward An Integrated Theory of Personality. in R. R. Blake and G. V. Ramsey (Eds.), *Perception: An Approach to Personality*. New York, NY, USA: Ronald, pp. 206-257.

26. Bronfenbrenner, U. (1952). Principles of professional ethics: Cornell studies in social growth. *American Psychologist*, 7(2), 452-5.

27. Bronfenbrenner, U. (1958). The study of identification through interpersonal perception. *Person perception and interpersonal behavior*, 110-130.

28. Bronfenbrenner, U. (1963). Why Do the Russians Plant Trees along the Road? S*aturday Review*, 46(95), 96

29. Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American psychologist*, 32(7), 513.

30. Bronfenbrenner, U. (1978). Who Needs Parent Education. *Teachers College Record*, 79(4), 767-87.

31. Bronfenbrenner, U. (1979). *The Ecology of Human Development*. Harvard University Press.

32. Bronfenbrenner, U. (1989, April). The developing ecology of human development: Paradigm lost or paradigm regained. In *Biennial meeting of the Society for Research in Child Development*, Kansas City, MO.

33. Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 187-249). London: Jessica Kingsley.

34. Bronfenbrenner, U. (1994). Ecological models of human development. In International Encyclopedia of Education, Vol. 3, 2nd. Ed. Oxford: Elsevier. Reprinted in: Gauvain, M. & Cole, M. (Eds.), *Readings on the development of children*, *2nd Ed*. (1993, pp. 37-43). NY: Freeman.

35. Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective. *Examining lives in context: Perspectives on the ecology of human development*, 619, 647.

36. Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nurture reconceptualized in developmental perspective: A bioecological model. *Psychological review*, 101(4), 568-586.

37. Bronfenbrenner, U., & Condry Jr, J. C. (1970). *Two worlds of childhood: US and USSR*. New York: Russell Sage.

38. Bronfenbrenner, U., & Devereux, E. C. (1952). Interdisciplinary planning for team research on constructive community behavior: The Springdale project. *Human Relations*, 5(2), 187-203.

39. Bronfenbrenner, U., & Evans, G. W. (2000). Developmental science in the 21st century: Emerging questions, theoretical models, research designs and empirical findings. *Social development*, 9(1), 115-125.

40. Bronfenbrenner, U., & Morris, P. (1998). The ecology of developmental processes. In *Theoretical models of human development*. Wiley.

41. Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. *Handbook of child psychology*.

42. Bronfenbrenner, U., & Newcomb, T. M. (1948). Improvisations—an application of psychodrama in personality diagnosis. *Sociatry*.

43. Bronfenbrenner, U., Kessel, F., Kessen, W., & White, S. (1986). Toward a critical social history of developmental psychology: A propaedeutic discussion. *American Psychologist*, 41(11), 1218.

44. Bump, Philip. (2016). Lead contamination exists throughout the U.S. -- but Flint has a special history. *Washington Post Journal*. Retrieved from https://www.washingtonpost.com/news/the-fix/wp/2016/01/19/lead-contamination-exists-throughout-the-u-s-but-flint-has-a-special-history/?utm_term=.eb07f9d0db34

45. Burden, M. (2016, May 26). GM to move some truck production to Flint from Mexico. Retrieved July 18, 2016, from http://www.detroitnews.com/story/business/autos/general-motors/2016/05/26/gm-move-truck-production-flint-mexico/84979274/

46. Burke, K. L. (2016). Flint Water Crisis Yields Hard Lessons in Science and Ethics. *American Scientist*, 104(3), 134.

47. Butler, L. J., Scammell, M. K., & Benson, E. B. (2016). The Flint, Michigan, Water Crisis: A Case Study in Regulatory Failure and Environmental Injustice. *Environmental Justice*, 9(4), 93-97.

48. Campbell, C., Greenberg, R., Mankikar, D., & Ross, R. D. (2016). A Case Study of Environmental Injustice: The Failure in Flint. *International Journal of Environmental Research and Public Health*, 13(10), 951.

49. Ceci, S. J. (January 01, 2006). Urie Bronfenbrenner (1917-2005). *The American Psychologist*, 61, 2.)

50. Ceci, S. J., & Bronfenbrenner, U. (1985). " Don't Forget to Take the Cupcakes out of the Oven": Prospective Memory, Strategic Time-Monitoring, and Context. *Child development*, 152-164.

51. Ceci, S. J., Rosenblum, T., de Bruyn, E., & Lee, D. Y. (1997). 10 A bio-ecological model of intellectual development: Moving beyond h^2. *Intelligence, heredity and environment*, 303.

52. Chambers, J. (2016, March 19). Flint's residents are building their legal case. Retrieved October 31, 2016, from http://www.detroitnews.com/story/news/michigan/flint-water-crisis/2016/03/18/flint-water-crisis-lawsuit-residents/82001886/

53. Clark, K. (2016). The Value of Water: The Flint Water Crisis as a Devaluation of Natural Resources, not a Matter of Racial Justice. *Environmental Justice*, 9(4), 99-102.

54. Clarke, A. E. (2010). *Biomedicalization*. John Wiley & Sons, Ltd.

55. CNBC. (2010, August 04). GM: History of An Automaker. Retrieved June 21, 2016, from http://www.cnbc.com/id/30962998

56. Community Grantmaking. (n.d.). Retrieved April 10, 2016, from http://www.ruthmottfoundation.org/rmf-grantsprograms/

57. Cosens, B., Craig, R., Hirsch, S. L., Arnold, C. A., Benson, M., DeCaro, D., ... & Schlager, E. (2017). The role of law in adaptive governance. *Ecology and Society*, 22(1).

58. Craft-Blacksheare, M. G. (2017). Lessons Learned From the Crisis in Flint, Michigan Regarding the Effects of Contaminated Water on Maternal and Child Health. J*ournal of Obstetric, Gynecologic & Neonatal Nursing*. 46(2), 258-266.

59. Craven, J., & Tynes, T. (2016). The Racist Roots of Flint's Water Crisis. *Huffington Post*. Retrieved from http://www.huffingtonpost.com/entry/racist-roots-of-flints-water-crisis_us_56b12953e4b04f9b57d7b118

60. Crowder, Kyle and Liam Downey. 2010. Inter-Neighborhood Migration, Race, and Environmental Hazards: Modeling Micro-Level Processes of Environmental Inequality. *American Journal of Sociology,* 115(4): 1110-1149.

61. Currell, M. J., & Han, D. (2017). The Global Drain: Why China's Water Pollution Problems Should Matter to the Rest of the World. *Environment: Science and Policy for Sustainable Development*, 59(1), 16-29.

62. Currell, M. J., & Han, D. (2017). The Global Drain: Why China's Water Pollution Problems Should Matter to the Rest of the World. *Environment: Science and Policy for Sustainable Development,* 59(1), 16-29.

63. Cuthbertson, C. A., Newkirk, C., Ilardo, J., Loveridge, S., & Skidmore, M. (2016). Angry, Scared, and Unsure: Mental Health Consequences of Contaminated Water in Flint, Michigan. *Journal of Urban Health*, 93(6), 899-908.

64. Dana, D. A., & Tuerkheimer, D. (2016). After Flint: Environmental Justice as Equal Protection. *Northwestern University Law Review,* 111, 93-102.

65. Daniels, H. (2005). An introduction to Vygotsky. Psychology Press.

66. Darden, J., Jones, L., & Price, J. (1998). Ethnographic Evaluation of the Behavioral Causes of Undercount in a Black Ghetto of Flint, Michigan. *Prepared under Joint Statistical Agreemen*t, 89, 43.

67. Davidson, A. (2016, January 22). The Contempt That Poisoned Flint's Water. *New Yorker,* Retrieved April 01, 2016, from http://www.newyorker.com/news/amy-davidson/the-contempt-that-poisoned-flints-water

68. Davis, K. M. (2016). False Assurances: The Effects of Corrosive Drinking Water and Noncompliance with Lead Control Policies in Flint, Michigan. *Environmental Justice,* 9(4), 103-108.

69. Den Hond, E., Celis, H., Vandenhoven, G., O'brien, E., & Staessen, J. A. (2003). Determinants of white-coat syndrome assessed by ambulatory blood pressure or self-measured home blood pressure. *Blood pressure monitoring*, 8(1), 37-40.

70. Devereux, E' C. , Bronfenbrenner, V., & Suci, G. J. (1962). Patterns of parent behavior in the United States of America and in the Federal Republic of Germany: A cross-national comparison. *International Sociological Science Journal,* 14, 488-506.

71. Dewey, J. (1903). Democracy in education. The elementary school teacher, 4(4), 193-204.

72. DeWitt, R. D. (2017). Pediatric lead exposure and the water crisis in Flint, Michigan. *Journal of the American Academy of Physician Assistants.*

73. Dignam, T. A. (2016, June). Methodological Approaches in Identifying an at-Risk Population during Lead in Water Crisis, Flint, Michigan, 2016. In 2016 *CSTE Annual Conference*. CSTE.

74. Dillon, S. (1998, June 23). A 20-Year G.M. Parts Migration To Mexico. *New York Times,* Retrieved September 01, 2016, from http://www.nytimes.com/1998/06/24/business/international-business-a-20-year-gm-parts-migration-to-mexico.html

75. Dixon, J. (n.d.). Time line: How Flint's water crisis unfolded. *Detroit Free Press,* Retrieved July 21, 2016, from http://www.freep.com/pages/interactives/flint-water-crisis-timeline/

76. Douglas, S. J. (2016). Without Black Lives matter, Would Flint's Water Crisis have Made Headlines? Retrieved from http://inthesetimes.com/article/18843/without-black-lives-matter-would-flints-water-crisis-have-made-headlines

77. Dulk, Kevin. (2016). Wake up, Christians: The Flint water crisis is an issue of public justice. *Washington Post Journal.* Retrieved from: https://www.washingtonpost.com/news/acts-of-faith/wp/2016/02/09/wake-up-christians-the-flint-water-crisis-is-an-issue-of-public-justice/?utm_term=.2b4acdb968b3

78. Early, S. (2017). *Refinery Town: Big Oil, Big Money, and the Remaking of an American City*. Beacon Press.

79. Edsforth, R. (1987). *Class Conflict and Cultural Consensus: The Making of a Mass Consumer Society in Flint. Michigan.* New Brunswick: Rutgers University Press, 1-3.

80. Edwards, M. (2016). Failure of the US Centers for Disease Control (CDC) and the US Environmental Protection Agency (EPA) to Protect Children from Elevated Lead in Drinking Water, 2001–Present. *Testimony before the House Committee on Oversight and Government Reform*.

81. Edwards, M. A., & Pruden, A. (2016). The Flint Water Crisis: Overturning the Research Paradigm to Advance Science and Defend Public Welfare. *Environmental Science & Technology*, 50(17), 8935-8936.

82. El-Sayed, A. M. (2016). What Is "Public" About Public Health: Lessons From Michigan. *American Journal of Public Health*, 106(7), 1171-1172.

83. Eligon, J. (2016). A Question of Environmental Racism in Flint. *New York Times,* Retrieved from https://www.nytimes.com/2016/01/22/us/a-question-of-environmental-racism-in-flint.html?_r=0

84. Ellis, F. (2016). Ahead of Print: Lead Crisis in Flint Exposes Continuing Risk to Children Nationwide What Neurologists Should Know and What They Can Do About It. *Neurology Today*.

85. Engel, P. (2016, January 17). How Flint, Michigan, became one of the most dangerous cities in America. *Business Insider.* Retrieved August 06, 2016, from http://www.businessinsider.com/why-is-flint-michigan-dangerous-2016-1

86. Engstrom, A. K., Snyder, J. M., Maeda, N., & Xia, Z. (2017). Gene-environment interaction between lead and Apolipoprotein E4 causes cognitive behavior deficits in mice. *Molecular Neurodegeneration*, 12(1), 14.

87. Ferguson, K. T., Kim, P., Dunn, J. R., & Evans, G. W. (2009). An ecological model of urban child health. *Urban health and society: Interdisciplinary approaches to research and practice,* 63-91.

88. Finnegan, W. (2016, February 03). Flint and the Long Struggle Against Lead Poisoning. *New Yorker.* Retrieved April 26, 2016, from http://www.newyorker.com/news/daily-comment/flint-and-the-long-struggle-against-lead-poisoning

89. Finstad, K. L. (2015). Exploring the development of school readiness in kindergarten in Norway: A case study of the implementation of the Gausdal Model. *Master's thesis, BRAGE Hihm.* Retrieved from https://brage.bibsys.no/xmlui/handle/11250/2368608

90. Flint Fwd. (2016, August 08). Inspiring New Video Answers the Question, "What is Flint?". Retrieved January 26, 2017, from http://www.prnewswire.com/news-releases/inspiring-new-video-answers-the-question-what-is-flint-300310522.html

91. Flint, R. W. (2010). The sustainable development of water resources. *Journal of Contemporary Water Research and Education*, 127(1), 6.

92. Ganim, S., & Tran, L. (2016). How tap water became toxic in Flint, Michigan. *CNN.* Retrieved from http://www.cnn.com/2016/01/11/health/toxic-tap-water-flint-michigan/

93. Garrison, K., Santoyo, J., Davis, J., Thornhill, T., Kerr, C., & Brewer, J. (2013). Effortless awareness: using real time neurofeedback to investigate correlates of posterior cingulate cortex activity in meditators' self-report. *Frontiers in human neuroscience*, 7, 440.

94. Giroux, H. (2016). *Poisoned City: Flint and the Specter of Domestic Terrorism. In America at War with Itself. America at War with Itself*. San Francisco, CA: City Lights Publishers. Kindle Edition.

95. Gold, M. (Ed.). (1999). *A Kurt Lewin reader: The complete social scientist*. Washington, DC: American Psychological Association.

96. Goovaerts, P. (2016). The drinking water contamination crisis in Flint: Modeling temporal trends of lead level since returning to Detroit water system. *Science of The Total Environment.*

97. Gostin, L. O. (2016a). Lead in the Water: A Tale of Social and Environmental Injustice. J*AMA*, 315(19), 2053-2054.

98. Gostin, L. O. (2016b). Politics and Public Health: The Flint Drinking Water Crisis. *Hastings Center Report,* 46(4), 5-6.

99. Habicht, J. P. (2016). Views After Flint Crisis. *American Scientist,* 104(5), 259-259.

100. Hacker, K. (2013). *Community-based participatory research*. Sage Publications.

101. Hackman, D. A., & Farah, M. J. (2009). Socioeconomic status and the developing brain. *Trends in cognitive sciences,* 13(2), 65-73.

102. Hammer, P. J. (2016). The Flint Water Crisis, KWA and Strategic-Structural Racism. *Written Testimony Submitted to the Michigan Civil Rights Commission Hearings on the Flint Water Crisis.* Retrieved from http://aclumich.org/sites/default/files/Hammer%20MCRC%20Testimony_0.pdf

103. Hanna-Attisha, M., LaChance, J., Sadler, R. C., & Champney Schnepp, A. (2016). Elevated blood lead levels in children associated with the Flint drinking water crisis: a spatial analysis of risk and public health response. *American journal of public health,* 106(2), 283-290.

104. Harris, M., & Butterworth, G. (2012). *Developmental psychology: a student's handbook.* Psychology Press.

105. Healy, C., & Bernstein, J. (2016). Legal and Policy Interventions to Address Developmental and Mental Health Impacts of the Flint Water Crisis. *Environmental Justice,* 9(6), 167-175.

106. Heinderyckx, F., & Vos, T. P. (2016). Reformed gatekeeping. *CM: Communication and Media,* 11(36), 29-46.

107. Hohn, D. (2016). Flint's Water Crisis and the 'Troublemaker' Scientist. *The New York Times Magazine.* Retrieved from http://www. nytimes. com/2016/08/21/magazine/flints-water-crisis-and-the-troublemakerscientist. html.

108. Houston, S. (2016). Towards a critical ecology of child development in social work: aligning the theories of Bronfenbrenner and Bourdieu. *Families, Relationships and Societies.*

109. IASC Taskforce on Accountability to Affected Populations: Co-Chaired by WFP and World Vision International. (2012). *Accountability to Affected Populations, Tools to assist in implementing the IASC AAP Commitments.* Retrieved from:https://interagencystandingcommittee.org/system/files/legacy_files/Tools%20to%20assist%20in%20implementing%20the%20IASC%20AAP%20Commitments.pdf

110. Jason, L. A., & Glenwick, D. S. (Eds.). (2015). *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods.* Oxford University Press.

111. Jones, C. (2016). Achieving health equity: The crisis in Flint, and what should be done next. *The Nation's Health*, 46(2), 3-3.

112. Katner, A., Pieper, K. J., Lambrinidou, Y., Brown, K., Hu, C. Y., Mielke, H. W., & Edwards, M. A. (2016). Weaknesses in Federal Drinking Water Regulations and

Public Health Policies That Impede Lead Poisoning Prevention and Environmental Justice. *Environmental Justice*, 9(4), 109-117.

113. Kaufman, A. S., Zhou, X., Reynolds, M. R., Kaufman, N. L., Green, G. P., & Weiss, L. G. (2014). The possible societal impact of the decrease in US blood lead levels on adult IQ. *Environmental research,* 132, 413-420.

114. Kennedy, C. (2016). Blood lead levels among children aged< 6 years—Flint, Michigan, 2013–2016. *Morbidity and Mortality Weekly Report*, 65.

115. Kennedy, M. (2016, February 02). Controversial Emergency Manager Of Detroit's Public Schools Resigns. *NPR.* Retrieved March 26, 2017, from http://www.npr.org/sections/thetwo-way/2016/02/02/465279038/controversial-emergency-manager-of-detroits-public-schools-resigns

116. Kitchener, B. A., & Jorm, A. F. (2002). Mental health first aid training for the public: evaluation of effects on knowledge, attitudes and helping behavior. *BMC psychiatry,* 2, 10-10.

117. Knieling, M. (2016). An Offense to Their Human Rights: Connecting Bud, not Buddy to the Flint Water Crisis with Middle School ELA Students. *Voices From the Middle*, 24(1), 31.

118. Krieger, N. (2016). Living and Dying at the Crossroads: Racism, Embodiment, and Why Theory Is Essential for a Public Health of Consequence. A*merican journal of public health*, 106(5), 832.

119. Krishnan, S. (2016). What Have We Learned About Learning? Reflections from Developmental Psychology and Cognitive Neuroscience. *Einstein Journal of Biology and Medicine,* 29(1), 26-31.

120. Kuehn, B. M. (2016). Pediatrician sees long road ahead for Flint after lead poisoning crisis. *JAMA,* 315(10), 967-969.

121. Laidlaw, M. A., Filippelli, G. M., Sadler, R. C., Gonzales, C. R., Ball, A. S., & Mielke, H. W. (2016). Children's blood lead seasonality in flint, Michigan (USA), and soil-sourced lead hazard risks. *International journal of environmental research and public health,* 13(4), 358.

122. Lambrinidou, Y. (2016). On Listening, Science, and Justice: A Call for Exercising Care in What Lessons We Draw from Flint. *Environmental Science & Technology,* 50(22), 12058-12059.

123. Landers, J. (2016). Drinking Water Crisis in Flint, Michigan, Prompts Congress to Consider Responses. Civil Engineering—*ASCE,* 86(4), 18-19.

124. Lang, S. S. (2005). In Appreciation-Urie Bronfenbrenner. *Association for Psychological Science-Observer.* Retrieved from http://www. psychologicalscience. org/observer/

125. Laubach, K. (2016). Epigenetics and Toxic Torts: How Epidemiological Evidence Informs Causation. *Wash. & Lee L. Rev.,* 73, 1019.

126. Leary, J. P. (2016, January 27). Flint's Bottom Line. *Jacobin*, Retrieved July 12, 2016, from https://www.jacobinmag.com/2016/01/flint-lead-water-crisis-michigan-snyder-emergency-contamination/

127. Lerner, R. M. (2006). Developmental science, developmental systems, and contemporary theories of human development. In Lerner, R. M., & Damon, W. E. (Eds.). *Handbook of child psychology: Theoretical models of human development,* Vol. 1. John Wiley & Sons Inc. pp 2-14

128. Levin, E. D. (2016). Crumbling Infrastructure and Learning Impairment: A Call for Responsibility. *Environmental health perspectives,* 124(5), A79-A79.

129. Lieberman, A. (2016). Recovery efforts in Flint slowly begin to take form. *The Lancet*, 387(10027), 1499.

130. Lipina, S. J., & Colombo, J. A. (2009). Poverty and brain development during childhood: An approach from cognitive psychology and neuroscience. *American Psychological Association.*

131. Lurie, J. (2016, January 21). Meet the mom who helped expose Flint's toxic water nightmare. Retrieved May 11, 2016, from http://www.motherjones.com/politics/2016/01/mother-exposed-flint-lead-contamination-water-crisis

132. Mann, T. J. (2016). Springtime in Flinttown: Disappointment, Affront, and Failure. *Environmental Justice*, 9(3), 65-68.

133. Mantha, A. (2016). The Flint MI Water Crisis: FlintWaterStudy's Journey With Flint Residents. Groundwater from the Mountains to the Sea in the Central Atlantic

Region. Retrieved November 04, 2016, from https://ngwa.confex.com/ngwa/mscar16/webprogram/Session10834.html

134. Mapping Projects. (n.d.). Retrieved February 11, 2017, from https://www.umflint.edu/gis/mapping-projects

135. Marcus, S. M., & LePlatte, D. (2016). 34.0 Community Crisis and Community Resilience: The Children of Flint, Michigan. *Journal of the American Academy of Child & Adolescent Psychiatry*, 55(10), S311.

136. Markel, H. (2016). Remember Flint. The Milbank Quarterly, 94(2), 229-236.

137. Markowitz, G. & Rosner , D., (2016, February 9). Welcome to the United States of Flint. Retrieved November 22, 2016, from http://www.tomdispatch.com/blog/176101/tomgram%253A_rosner_and_markowitz,_welcome_to_the_united_states_of_flint/

138. Masten, S. J., Davies, S. H., & McElmurry, S. P. (2016). Flint Water Crisis: What Happened and Why? *Journal-American Water Works Association*, 108(12), 22-34.

139. Mazur, A. (2016). Lead, Flint, and Grandfather. *Society*, 53(5), 516-522.

140. McClelland, E. (2013). Flint's Man in Washington: The Fight for Legacy Cities Moves to Capitol Hill. *Forefront*, Volume 1(Issue 79), 1-11. Retrieved from https://nextcity.org/features/view/flints-man-in-washington

141. McGuire, M. J., Beecher, J. A., Hanna-Attisha, M., Masten, S. J., & Rose, J. B. (2016). Roundtable--The Flint Crisis. *Journal-American Water Works Association*, 108(7), 26-34.

142. McKenna, L. (2012). Explaining Annette Lareau, or, Why Parenting Style Ensures Inequality. *The Atlantic*, Retrieved from http://www.theatlantic.com/health/archive/2012/02/explaining-annette-lareau-or-why-parenting-style-ensures-inequality/253156/

143. McKnight, J. L., & Kretzmann, J. P. (1997). Mapping Community Capacity. *Community organizing and community building for health*, 157.

144. McLeroy, K. R., Norton, B. L., Kegler, M. C., Burdine, J. N., & Sumaya, C. V. (2003). Community-Based Interventions. *American Journal of Public Health*, 93(4), 529.

145. Merzel, C., & D'Afflitti, J. (2003). Reconsidering community-based health promotion: promise, performance, and potential. *American journal of public health,* 93(4), 557-574.

146. Miller, D. S., & Wesley, N. (2016). Toxic Disasters, Biopolitics, and Corrosive Communities: Guiding Principles in the Quest for Healing in Flint, Michigan. *Environmental Justice,* 9(3), 69-76.

147. Minkler, M., & Wallerstein, N. (Eds.). (2011). *Community-based participatory research for health: From process to outcomes.* John Wiley & Sons.

148. Miracle, V. A. (2017). Lead Poisoning in Children and Adults. *Dimensions of Critical Care Nursing*, 36(1), 71-73.

149. Mooney, C. (2016). It's not just Flint: Poor communities across the country live with 'extreme' polluters. *Washington Post Journal.* Retrieved from https://www.washingtonpost.com/news/energy-environment/wp/2016/01/27/its-not-just-flint-poor-communities-across-the-country-live-with-extreme-polluters/

150. Moore, M. (1989). *Roger and Me* [film]. Burbank, CA: Warner Brothers.

151. Moore, M. (2016). Don't Send Bottled Water. Retrieved July 12, 2016, from http://michaelmoore.com/DontSendBottledWater/

152. Morckel, V. (2017). Why the Flint, Michigan, USA water crisis is an urban planning failure. *Cities,* 62, 23-27.

153. Morrison, D.E., & Riley D. (1986). Environmentalism and Elitism: A Conceptual and Empirical Analysis. *Environmental Management,* 10 (5): 581-89

154. Moyo, O. N. (2017). A Beautiful Community, But a Troubled City: Flint's Water Crisis. Alternate Routes: *A Journal of Critical Social Research*, 28.

155. Munakata, Y., Casey, B. J., & Diamond, A. (2004). Developmental cognitive neuroscience: progress and potential. *Trends in cognitive sciences,* 8(3), 122-128.

156. Nelson, R. (2016). Crisis in Flint: lead and Legionnaires' disease. *The Lancet Infectious Diseases*, 16(3), 298-299.

157. Newbrough, J. R. (2013). 9 Community psychology. A Century of Psychology. In *Psychology Revival:Progress, Paradigms and Prospects for the New Millennium*, 139.

158. Novick, M. (2016). Imperialist & Settler Colonial Privilege: Water, Water Everywhere, Nor Any a Drop To Drink. *Turning The Tide*, 28 (7):1-11.

159. Obama, B. (2016). Remarks by the President to the Flint Community -- Flint, MI. Retrieved July 12, 2016, from https://www.whitehouse.gov/the-press-office/2016/05/04/remarks-president-flint-community-flint-mi

160. Oleske, J. M., & Bogden, J. D. (2016). Lessons for Flint's Officials and Parents From Our 1970s Newark Lead Program. American journal of public health, 106(6), e1.

161. Onwuegbuzie, A. J., Collins, K. M. T., & Frels, R. K. (2013). Foreword: Using Bronfenbrenner's ecological systems theory to frame quantitative, qualitative, and mixed research. *International Journal of Multiple Research Approaches,* 7, 2–8.

162. Opdenakker, R. (2006, September). Advantages and disadvantages of four interview techniques in qualitative research. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* Vol. 7, No. 4.

163. Parker, J.D., and Maureen H. M. (1999). Environmentalism of African Americans: An Analysis of the Subculture and Barriers Theories. *Environment and Behavior,* 31 (2): 155-77.

164. Pauli, B. J. (2016). Rethinking the urban crisis in Flint, Michigan. *City*, *20*(3), 512-516.

165. Pellow, D. (2000). Environmental Inequality Formation: Toward a Theory of Environmental Injustice. *American Behavioral Scientis*t 43(4): 581-601.

166. Pence, J. (2016). *Network Analysis of Inter-Organizational Communication Leading to the Flint Water Crisis*. Communication. University of Illinois Urbana-Champaign. Retrieved from http://soteria.npre.illinois.edu

167. Pepper, S. C. (1942). World hypotheses: *A study in evidence.* Univ of California Press.

168. Pieper, K. J., Tang, M., & Edwards, M. A. (2017). Flint Water Crisis Caused By Interrupted Corrosion Control: Investigating "Ground Zero" Home. *Environmental Science & Technology.*

169. Plant, F. W., & Gordon, B. (2016). The Flint Water Crisis and Beyond. *Natural Hazards Observer,* 40(4).

170. Plomin, R., Pedersen, N. L., McClearn, G. E., Nesselroade, J. R., & Bergeman, C. S. (1988). EAS temperaments during the last half of the life span: Twins reared apart and twins reared together. *Psychology and Aging*, 3(1), 43.

171. Pulido, L. (2016). Flint, Environmental Racism, and Racial Capitalism. *Capitalism Nature Socialism,* 27(3), 1-16.

172. Ranganathan, M. (2016). Thinking with Flint: Racial Liberalism and the Roots of an American Water Tragedy. Capitalism Nature *Socialism,* 27(3), 17-33.

173. Rasmussen, A., Akinsulure-Smith, A. and Chu, T. (2015). Grounded Theory. *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods*, 23-32.

174. Rendleman, D. (1995) In C. Hilberry & J. Kearns (Eds.), *New Poems from the Third Coast: Contemporary Michigan Poetry.*

175. Riley, S., Schouten, W., & Cahill, S. (2003). Exploring the dynamics of subjectivity and power between researcher and researched. In *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research* (Vol. 4, No. 2).

176. Robeznieks, A. (2015). The long shadow of Flint's lead crisis. *Modern Healthcare,* 45(41):9.

177. Rosenthal, B. M., Farris, M. A., & Tyler, A. R. (2005). Toxic Torts and Mass Torts. *SMUL Rev.*, 58, 1183.

178. Rosner, D. (2016). Flint, Michigan: a century of environmental injustice. *American journal of public health*, 106(2), 200-201.

179. Roy, S. (2017). The Hand-in-Hand Spread of Mistrust and Misinformation in Flint. *American Scientist*, 105(1), 22.

180. Rugh, P. (2014, 23-July). Who bled Detroit dry? *Vice,* Retrieved June 2015, from http://www.vice.com/read/who-bled-detroit-dry?utm_source=vicetwitterus

181. Ryder, S. (2016). The Flint Water Crisis and Beyond. *Climate Change and Indigenous People,* 23.

182. Sadler, R. C., & Highsmith, A. R. (2016). Rethinking Tiebout: The Contribution of Political Fragmentation and Racial/Economic Segregation to the Flint Water Crisis. *Environmental Justice*, 9(5), 143-151.

183. Salinsky, J. I. (2016). Comparing the 2014–2016 Flint Water Crisis to the 1993 Milwaukee Cryptosporidium Outbreak. *Environmental Justice*, 9(4), 119-128.

184. Sanson, A., Nicholson, J., Ungerer, J., Zubrick, S., Wilson, K., Ainley, J., ... & Rodgers, B. (2002). Longitudinal Study of Australian Children. Discussion Paper. *Australian Institute of Family Studies*, (1). Melbourne, Australia.

185. Santrock, J. W. (2007). *Child Development*. Eleventh edition. NY: McGraw-Hill Companies, Inc.

186. Saura, D. M., & Balsas, P. R. (2014). Interviewing and surveying over the phone: a reflexive account of a research on parenting. *Quality & Quantity*, 48(5), 2615-2630.

187. Schecter, B. (2011). "Development as an Aim of Education": A Reconsideration of Dewey's Vision. *Curriculum Inquiry*, 41(2), 250-266.

188. Semuels, A. (2016). A Tale of Two Water Systems. *The Atlantic*, Retrieved February 29, 2016 from http://www.theatlantic.com/business/archive/2016/02/a-tale-of-two-water-systems/471207.

189. Shafer, G. (2016). Confronting WHITENESS and the FLINT WATER CRISIS. *The Humanist*, 76(2), 22.

190. Shields, S. A. (2008). Gender: An intersectionality perspective. *Sex roles*, 59(5-6), 301-311.

191. Shulman, E. P., Smith, A. R., Silva, K., Icenogle, G., Duell, N., Chein, J., & Steinberg, L. (2016). The dual systems model: Review, reappraisal, and reaffirmation. *Developmental cognitive neuroscience*, 17, 103-117.

192. Sokolow, J. (2017, April). The Flint, Michigan Water Crisis: Using Systems Thinking to Understand Complex Problems and Identify and Rectify Critical Failures. In *APPAM DC Regional Student Conference*. APPAM.

193. Soleri, D., Long, J., Ramirez-Andreotta, M., Eitemiller, R., & Pandya, R. (2016). Finding pathways to more equitable and meaningful public-scientist partnerships. *Citizen Science: Theory and Practice*, 1(1).

194. Soto, J. A., Roberts, N. A., Pole, N., Levenson, R. W., Burleson, M. H., King, A. R., & Breland-Noble, A. (2012). Elevated baseline anxiety among African Americans in laboratory research settings. *Journal of Psychophysiology*.

195. Stanik, C. (2016, May 03). Should We Invest More in Our Young Children? Retrieved February 27, 2017, from http://altarum.org/health-policy-blog/should-we-invest-more-in-our-young-children

196. Stillman, S. (2017, January 24). Can Behavioral Science Help in Flint? *New Yorker,* Retrieved March 12, 2017, from http://www.newyorker.com/magazine/2017/01/23/can-behavioral-science-help-in-flint

197. Stoecker, R. (2012). *Research methods for community change: A project-based approach*. SAGE Publications. Kindle Edition.

198. Stoller, K. (2016). *Incurable Me: Why the Best Medical Research Does Not Make It into Clinical Practic*e. Skyhorse Publishing. Kindle Edition.

199. Sturges, J. E., & Hanrahan, K. J. (2004). Comparing telephone and face-to-face qualitative interviewing: a research note. *Qualitative research,* 4(1), 107-118.

200. Suls, J., & Rothman, A. (2004). Evolution of the biopsychosocial model: prospects and challenges for health psychology. *Health Psychology*, 23(2), 119.

201. Taylor, J. Y., Wright, M. L., & Housman, D. (2016). Lead toxicity and genetics in Flint, MI. *NPJ Genomic Medicine*, 1.

202. The Building Neighborhood Capacity Program (BNCP) Flint (n.d.). Retrieved June 4, 2016, from http://www.northflintcorp.com/wp-content/uploads/2016/03/Flint-BNCP-At-A-Glance_Feb10.pdf

203. Tudge, J. R., Mokrova, I., Hatfield, B. E., & Karnik, R. B. (2009). Uses and misuses of Bronfenbrenner's bioecological theory of human development. *Journal of Family Theory & Review*, 1(4), 198-210.

204. Tudge, J. R., Payir, A., Merçon-Vargas, E., Cao, H., Liang, Y., Li, J., & O'Brien, L. (2016). Still Misused After All These Years? A Reevaluation of the Uses of Bronfenbrenner's Bioecological Theory of Human Development. *Journal of Family Theory & Review*, 8(4), 427-445.

205. University Avenue Corridor Neighborhood Revitalization Initiative. (n.d.). Retrieved March 30, 2017, from https://www.umflint.edu/research/university-avenue-corridor-neighborhood-revitalization-initiative

206. Urie Bronfenbrenner papers, #23-13-954. *Division of Rare and Manuscript Collections*, Cornell University Library. Retrieved from http://rmc.library.cornell.edu/EAD/htmldocs/RMA00954.html

207. Vaccari, D. A. (2016). How Not to Get the Lead Out—Lead Service Line Replacement Will Not Solve Our Drinking Water Crisis. *Current Pollution Reports,* 2(3), 200-202.

208. Wallerstein, N. and Duran, B. (2010). The theoretical, historical and practice roots of CBPR. Minkler, M., & Wallerstein, N. (Eds.). *Community-based participatory research for health: From process to outcomes.* John Wiley & Sons.

209. Ward, K., Gott, M., & Hoare, K. (2015). Participants' views of telephone interviews within a Grounded Theory study. *Journal of advanced nursing,* 71(12), 2775-2785.

210. Warren, C. (2001). *Brush with death: a social history of lead poisoning*. JHU Press.

211. Washington Post. (2016) Transcript: The Democrats' debate in Flint, annotated. *The Washington Post*, Retrieved from https://www.washingtonpost.com/news/the-fix/wp/2016/03/06/the-democrats-debate-in-flint-mich-annotated/ (accessed on April 15, 2016)

212. Washington, S. H., & Foster, S. R. (2016). The Legal Discourse Surrounding the Water Crisis in Flint, Michigan: Interview with Sheila R. Foster. *Environmental Justice*, 9(2), 59-64.

213. Washington, S. H., & Pellow, D. (2016). Water Crisis in Flint, Michigan: Interview with David Pellow, Ph. D. *Environmental Justice*, 9(2), 53-58.

214. Weesjes, E. (2016). Weakened Resolve – Flint Crisis Hasn't Steeled the Nation Against the Health Risks of Lead. *Disaster Research*, Retrieved from https://hazards.colorado.edu/article/weakened-resolve-flint-crisis-hasn-t-steeled-the-nation-against-the-health-risks-of-lead (accessed on April 15, 2016).

215. Working to Move Flint Forward – Video. (n.d.). Retrieved July 12, 2016, from http://flintfwd.org/wp/2016/03/29/working-to-move-flint-forward-video/

216. Yang, E. (2017). Temporal dynamics of public perceptions toward water infrastructure in US shrinking cities before and after the Flint Water Crisis. *The University of Texas at Austin*, Retrieved from https://repositories.lib.utexas.edu/bitstream/handle/2152/45859/Yang-Thesis-2016.pdf?sequence=1&isAllowed=y

217. Young, G. (2015, October 27). International Students Find the American Dream in Flint. *New York Times,* Retrieved November 04, 2016, from https://www.nytimes.com/2015/11/01/education/edlife/international-students-find-the-american-dream-in-flint.html?_r=0

218. Zigler, E., & Muenchow, S. (1992). *Head Start: The inside story of America's most successful educational experiment*. Basic Books.

APPENDICES

A. Parent Scripts/Interview Questions

Parent Participants' Script:

Hello! I'm Khushboo Shah, the paralegal at Levy Konigsberg LLP who's running the research study with the amazon.com gift card raffle that you signed up for. I'm calling you because you're eligible to participate! Is this a good time to talk?

Great. Firstly, I want to let you know that you can discontinue your participation in this study at any time without affecting your chances to be included in the raffle. The study is about how the community is affected by the water crisis in Flint, with a view to helping identify what the most important issues are according to you— the people of Flint. The study includes a phone interview of five questions which can take anything between 10-40 minutes and an online survey of 25 questions which can take between 30-60 minutes to complete. There are no major risks to you if you participate, but the questions may make you think a lot about how the Flint Water Crisis has affected you. Although you will not directly benefit from participating this study, your participation will add to really important knowledge that can help many. Please note that given the nature and scope of the study, there will be no opportunity for professional intervention in case the questions cause distress

I will be recording this interview so that I can write down your answers after we finish the call, as it is not possible for me to write at speaking-speed. I will store the recordings on an protected computer, and name the files with a number that only I know is assigned to your case. I will delete these files as soon as I have finished writing the information down, and no one but me will ever hear them. The written copies of your answers will not be shared with anyone else, although the general content of your answers will be shared with the law firm, which will use your data to improve the lawsuit that is proceeding on your behalf. Please note that participation in this research study will not impact your legal case whatsoever. There are some questions in the study that the firm is interested in for litigation purposes, but if you do not participate, you will be contacted later and asked those questions separately, disconnected from this research.

In case you have any problems, comments or questions regarding this study, you can call my superiors at 914 395 2606 for Professor Claire Davis or email them at irb@slc.edu. I've emailed this information to you at the email address you signed up with as well.

Do you feel comfortable proceeding with the interview?

Wonderful!

Now I'm going to ask you five questions as part of the first stage of the study one by one. I'll wait for you to tell me you're ready to move on to the next question after you're sure you've finish answering. When you are thinking about your answers, keep in mind that the study is broadly considering things like children's changing perspectives on safety in the environment, home life with behavioral changes in children, school life and future success as learning changes in children, children's body image and health-anxieties after the Flint Water crisis, etc. OK, are you ready for the 1st question?

… Start asking questions.

Pilot Study Parent Phone Interview Questions:

1) What can you tell me about how the Flint Water Crisis has affected you and your children?
2) What do you feel are the greatest challenges you face at this time regarding your children?
3) Are there any resources in particular that you feel like they need the most?
4) Are there any programs or community resources that you can think of which really help your children?
5) Do you think there has been any positive aspect of the conversation surrounding the Flint Water Crisis?

B. Community Script/Interview Questions

Community Participants' Script:

Hello! I'm Khushboo Shah, the paralegal at Levy Konigsberg LLP who's running the research study with the amazon.com gift card raffle that you signed up for. I'm calling you because you're eligible to participate! Is this a good time to talk?

Great. Firstly, I want to let you know that you can discontinue your participation in this study at any time without affecting your chances to be included in the raffle. The study is about how the community is affected by the water crisis in Flint, with a view to helping identify what the most important issues are according to you— the people of Flint. The study includes a phone interview of seven questions which can take anything between 10-40 minutes. There are no major risks to you if you participate, but the questions may make you think a lot about how the Flint Water Crisis has affected you. Although you will not directly benefit from participating this study, your participation will add to really important knowledge that can help many. Please note that given the nature and scope of the study, there will be no opportunity for professional intervention in case the questions cause distress

I will be recording this interview so that I can write down your answers after we finish the call, as it is not possible for me to write at speaking-speed. I will store the recordings on an protected computer, and name the files with a number that only I know is assigned to your case. I will delete these files as soon as I have finished writing the information down, and no one but me will ever hear them. The written copies of your answers will not be shared with anyone. You will not be identified in any publication from this study.

In case you have any problems, comments or questions regarding this study, you can call my superiors at 914 395 2606 for Professor Claire Davis or email them at irb@slc.edu. I've emailed this information to you at the email address you signed up with as well.

Do you feel comfortable proceeding with the interview?

Wonderful!

Now I'm going to ask you seven questions as part of the first stage of the study one by one. I'll wait for you to tell me you're ready to move on to the next question after you're sure you've finish answering. When you are thinking about your answers, keep in mind that the study is broadly considering things like children's changing perspectives on safety in the environment, home life with behavioral changes in children, school life and future success as learning changes in children, children's body image and health-anxieties after the Flint Water crisis, etc. OK, are you ready for the first question?

… Start asking questions.

Pilot Study Community Phone Interview Questions:

1) Please describe briefly the nature and purpose of your work with children in Flint, MI.

2) What can you tell me about how the Flint Water Crisis has affected your work with children?

3) What do you feel are the greatest challenges you face at this time regarding the children you work with?

4) Are there any resources in particular that you feel like they need the most?

5) Are there any programs or community resources that you can think of which really help the children you work with?

6) Do you think there has been any positive aspect of the conversation surrounding the Flint Water Crisis?

7) What kind of support do you think you need in order to be able to personally help deal with the fallout from the Flint Water Crisis?